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JANUARY 15, 1979

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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 12, NUMBER 2
JANUARY 15, 1979

W79-00501 -- W79-01000

The Secretary of the U.S. Department of the Interior has determined that the publication of the periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1983.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

SECOND ROW MOLECULAR ORBITAL CALCULATIONS MINIMAL AND MINIMAL +3D BASIS CALCULATIONS ON SECOND ROW DIATOMICS,
North Dakota State Univ., Fargo. Dept. of Chemistry.
F. J. Marsh, and M. S. Gordon.
Chemical Physics Letters. Vol. 45, No. 2, p 255-260, January 15, 1977. 5 tab, 24 ref. OWRT A-045-NDAK(1), 14-34-0001-6035.

Descriptors: *Mathematical models, *Molecular structure, Equilibrium, *Diatomic molecules, *Dipole moments, Bond length(Atoms).

The optimal valence orbital exponents of a series of 24 diatomic molecules containing second row atoms are determined, with and without 3d orbitals in the basis set. Equilibrium bond lengths and dipole moments are calculated using Slater exponents as well as the optimal values. Optimization of valence s and p exponents is as important as the addition of d orbitals to the basis set for bond length predictions. Separate optimization of d exponents does not significantly improve calculated bond lengths. The computed dipole moments are less satisfactory for all basis sets, although the optimal exponent basis including d orbitals are in best overall agreement with experiment.
W79-00681

DENSITY MAXIMA IN HIGH-PRESSURE SUPERCOOLED WATER AND LIQUID SILICON DIXOIDE,
Purdue Univ., Lafayette, IN. Dept. of Chemistry.
C. A. Angell, and H. Kanno.
Science, Vol. 193, p 1121-1122, September 1976, 2 fig, 16 ref. OWRT B-051-IND(10).

Descriptors: *Supercooling, *High pressure, *Nucleation, Deuterium, Crystallization, Physical properties, Density, Thermal properties, *Temperature of Maximum Density, *Nucleation temperature.

With glass capillary pressure vessels it has been possible to study the effect of pressure on the temperature of maximum density (TMD) and on the 'sharpness' of the density maximum in liquid H2O and D2O in the important but little-studied supercooled regime. A pressure of 1200 bars produces a 33 degree C depression of the TMD in these liquids and a considerable reduction in sharpness. Comparison with the rather flat density maximum for liquid SiO2 supports the notion that the presence or absence of density anomalies in 'tetrahedral' liquids depends on the average bridge-pond angle, which is evidently unusually large in water at normal pressure.
W79-00864

ISOTHERMAL COMPRESSIBILITY OF SUPERCOOLED WATER AND EVIDENCE FOR A THERMODYNAMIC SINGULARITY AT -45 DEGREES C,
Purdue Univ., Lafayette, IN. Dept. of Chemistry.
R. J. Speedy, and C. A. Angell.
The Journal of Chemical Physics, Vol. 65, No. 3, p 851-858, August 1976, 5 fig, 1 tab, 32 ref. OWRT B-051-IND(9).

Descriptors: *Supercooling, *Compressibility, Hydrogen bonding, Water properties, *Supercooled water, *Isothermal compressibility.

Using a capillary technique for small samples, the isothermal compressibility kappa tau of water has been measured to -26 degrees C. Accelerating increases of kappa tau at the lower temperatures can be described by an expression of the form kappa tau = alpha episilon gamma (where episilon = (T - Ts)/Ts), which is known to describe anomalies encountered in the vicinity of a thermodynamic singularity located at Ts. The implications that the thermodynamic and certain other properties of water at lower temperatures may be decomposed into a normal component and an anomalous component which diverges at Ts = -45 degrees C is supported by analysis of numerous other thermodynamic and relaxation data which extend into the supercooled regime. The anomalous characteristics are shown to originate primarily in the sensitivity of the volume to temperature changes, suggesting a geometrical basis for the cooperative behavior. The singularity at Ts = -45 degrees C may be a lambda transition associated with the cooperative formation of an open hydrogen-bonded network, but the near coincidence of Ts with the experimental homogeneous nucleation temperature suggests, as an alternative, that Ts may correspond to the limit of mechanical stability for the supercooled liquid phase.
W79-00866

2. WATER CYCLE

2A. General

DEVELOPMENT OF COMPUTER PROGRAM FOR LINEARIZED SUBHYDROGRAPHS METHOD FOR URBAN RUNOFF DETERMINATION,
Akron Univ., OH. Dept. of Civil Engineering.
S. Sarikelle.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 300, Price codes: A08 in paper copy, A01 in microfiche. Ohio Water Resources Center, Columbus, Completion Report, November 1977. 148 p, OWRT A-052-OHIO(1).

Descriptors: *Hydrologic models, *Runoff, *Surface runoff, *Computer models, *Storm runoff, Hydraulics, Hydrology, *Stormwater management, *Hydrograph simulation, Urban drainage.

A model for the simulation of urban runoff based on Linearized Subhydrographs Method of Urban Runoff Determination is developed for the planning and analysis of converging stormwater drainage systems in small and large urban areas. The model simulates hydrographs for both continuously recorded rainstorm events and synthetic design hyetographs. The model is applied to various urban watersheds with differing land use characteristics utilizing recorded hyetographs. The simulated hydrographs are then compared to recorded hydrographs. The results indicate that when single event hyetographs are utilized, the simulated hydrographs for both the inlet and pipe conditions compare well to those results obtained from measured values. The model structure and input requirements needed for the utilization of the program are presented. The limitations of the model are examined, and future research to improve this method is included.
W79-00526

MODELING OF HYDRAULIC SYSTEMS BY FINITE-ELEMENT METHODS,
Geological Survey, Menlo Park, CA. Water Resources Div.
R. T. Cheng.
In: Advances in Hydroscience, Vol 11, Academic Press Inc., New York, p 207-284, 1978. 25 fig, 2 tab, 121 ref.

Descriptors: *Model studies, *Hydraulic systems, *Finite element analysis, *Numerical analysis, Groundwater movement, Lakes, Waves(Water), Evaluation, *Rayleigh-Ritz method, *Galerkin procedures.

The state of the art of the finite-element technique is reviewed. Both the Rayleigh-Ritz and Galerkin procedures are discussed in detail and their equivalences and differences are shown. Emphasis is placed on the finite-element modeling and solution techniques when applied to hydrologic systems. Using examples of subsurface and surface hydrologic problems, the principles, techniques and applications of the finite-element methods are demonstrated. (Woodard-USGS)
W79-00634

A MOISTURE-ACCOUNTING WATERSHED MODEL FOR SINGLE-STORM EVENTS BASED ON TIME-AREA CONCEPT,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
R. Krzysztofowicz, and M. H. Diskin.
Journal of Hydrology, Vol. 37, 1978, p 261-294. 7 tab, 12 fig, 15 ref.

Descriptors: *Model studies, *Hydrographs, *Rainfall-runoff relationships, Storms, Simulation analysis structural models, Analytical techniques, Climatic data, Theoretical analysis, Depth-area-duration analysis.

A model is presented in which a total hydrograph is derived from a single storm. The model is formulated upon two principles: (1) a single lumped input system is impractical when representing a storm which contains variability of rainfall. Consequently, it is necessary to divide the area into smaller zones of uniform rainfall input. (2) Since total rainfall input is divided into surface runoff, base flow runoff and losses based upon the moisture content of the upper soil layer, accounting procedures must be incorporated into the model. Procedures for identifying model parameters are demonstrated using the Raba River in Southern Poland. Calibration results and sensitivity analysis demonstrate the usefulness of the model. Because of this model's ability to account for rainfall variability it should be particularly valuable in the arid regions of the world where rainfall variation is characteristic. (Tickes-Arizona)
W79-00813

DIURNAL STRATIFICATION OF DEEP WATER IMPOUNDMENTS,
Missouri Univ., Rolla. Dept. of Mechanical and Aerospace Engineering.
For primary bibliographic entry see Field 2H.
W79-00874

GALERKIN METHOD FOR A NON-LINEAR PARABOLIC EQUATION WITH MIXED NON-LINEAR BOUNDARY CONDITIONS,
California Univ., Santa Barbara. Coll. of Engineering.
For primary bibliographic entry see Field 2G.
W79-00900

2B. Precipitation

HYDROLOGY, FULTON COUNTY, NEW YORK,
Fulton County Planning Dept. Johnstown, NY.
For primary bibliographic entry see Field 4A.
W79-00663

AVAILABILITY OF ATMOSPHERIC WATER,
Rhodesia Dept. of Meteorological Service, Salisbury.
J. D. Torrance.
Transactions of the Rhodesian Scientific Association, Vol. 56, No. 2, p 31-45, 1975. 6 fig, 6 tab, 1 ref.

Descriptors: *Rainfall, *Moisture content, *Atmosphere, *Model studies, Mathematical models, Computer models, Precipitation(Atmospheric), Cloud physics, Cloud seeding, Weather modification, Meteorology, *Rhodesia.

A study was undertaken to investigate the relationships between atmospheric moisture and rainfall. It was found that: (1) there is a rather small interseasonal variation in totals of precipitable water, compared with the corresponding variation in rainfall; (2) there is a good agreement between interseasonal totals of precipitable water on raindays only, and rainfall totals; (3) there is good agreement between precipitable water and rainfall index; (4) on daily values, there is a general increase in the amount of rain as the precipitable water total increases; but dry days can still occur with any value of precipitable water; (5) high values of precipitable water are then a necessary, but not by themselves sufficient, condition for conversion of atmospheric moisture into rainfall. Computer modeling was used to show that the quantity of water vapor used by a thunderstorm is comparable with that held by the atmosphere per unit area. It was shown that even periods of heavy widespread rain do not deplete the reserves of moisture held in the atmosphere excessively, and it was clear that cloud-seeding activities are not likely to utilize more than a small proportion of the water vapor available in the air. There need be no concern that cloud seeding will deprive any area of its rightful share of the atmospheric moisture. (Sims-ISWS)
W79-00685

PROBABILITY ESTIMATE OF SNOW-COVER DEPTH DISTRIBUTION,
For primary bibliographic entry see Field 2C.
W79-00705

HARVEST DATES IN ANCIENT MESOPOTAMIA AS POSSIBLE INDICATORS OF CLIMATIC VARIATIONS,
Hebrew Univ., Jerusalem (Israel). Dept. of Atmospheric Sciences.
J. Neumann, and R. M. Sigrist.
Climatic Change, Vol. 1, No. 3, p 239-256, 1978. 2 tab, 2 fig, 52 ref.

Descriptors: *Paleoclimatology, *Bioindicators, *Paleohydrology, *Climatology, Arid climates, History, Meteorological data, Regional analysis, Agroclimatology, Crop response, Harvesting, Seasonal, Near East, Rainfall, Weather patterns.

Climatic development and change in the Near East including Mesopotamia since 2500 B.C. was first studied by Butzer in 1958 and has been the subject of several more recent studies. The basis for these studies is that in mediterranean type climate such as that in the Near East a negative correlation can be made between winter temperatures and seasonal rainfall. Many of these studies have agreed upon the speculation that a period of increased aridity began in this area about 2500 B.C. and was followed by a period of higher rainfall beginning about 850 B.C. The purpose of this study was to check these speculations based upon the examination of clay tablet inscriptions from ancient Babylonia that provided information about the dates of Barley harvest for two perods: 1800 B.C. to 1625 B.C. and 600-400 B.C. These tablets tell us that in the earlier period, harvest began late in March or early in April, while in the latter period it began late in April or in May, a Significant difference of a month or more. Presently, harvests in the Near East begin in the second half of April. These differences, too large to be caused by varietal change, support the speculation that the earlier period experienced a warmer more dry climate and the later period a cooler and more humid climate that is present today. (Tickes-Arizona)
W79-00816

A FLASH FLOOD AID - THE LIMITED AREA QPF,
National Weather Service, Fort Worth, TX. Southern Region.
J. Belville, G. A. Johnson, and J. D. Ward.
NOAA Technical Memorandum NWS SR-97, March 1978. 13 p, 2 fig, 3 tab, 21 ref, append.

Descriptors: *Flood forecasting, *Forecasting, *Rainfall, *Flash floods, *Texas, Quantitative Precipitation Forecast(QPF).

The Quantitative precipitation Forecast (QPF) shows the areal distribution and the amount of rainfall expected to occur over agiven period of tie. The most important facet of the QLPF is that it alerts the forecasters to the potential for excessive rains. The WSFO Lubbock QLPF procedures were developed primarily to indicate the maximum amount of precipitation expected within an area. Parameters investigated were climatology, certain 500 mb flow patterns, and five atmospheric variables which had been found t correlate well with episodes of heavy rain. These variables were lifted index, K-index, mean relative humidity (surface to 500 mb), tropopause temperatures, and precipitable water. Other variables, such as surface dew points and windsa aloft, may be incorporated into the program in the future; but the program should be kept simple and relatively easy for the forecasters to use.(NOAA)
W79-00994

2C. Snow, Ice, and Frost

DEVELOPMENT OF AN OPERATIONAL NORTHERN AQUATIC ECOSYSTEM MODEL,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 2H.
W79-00513

EFFECTS OF PERMAFROST ON STREAM CHANNEL BEHAVIOR IN ARCTIC ALASKA,
Geological Survey, Laguna Niguel, CA. Water Resources Div.
K. M. Scott.
Available from Supt. of Documents, GPO, Washington, DC 20402, Price $1.20. Professional Paper 1068, 1978. 19 p, 11 fig, 2 tab, 38 ref.

Descriptors: *Channel erosion, *Scour, *Permafrost, *Ice breakup, *Alaska, Streams, Drainage area, Floods, *Arctic Coastal Plain.

Sites with drainage areas ranging from 88 to 12,200 sq km were monitored on five streams in northern Alaska during the breakup in 1976 to determine (1) the effects of frozen bed and bank material on channel behavior, and (2) the importance of the annual breakup flood in forming the channels of arctic streams. The thawing and concomitant erosion of channels varied with changes in bed-material size, channel pattern, drainage area, and climate. The response of channels to breakup flooding ranged from total permafrost control of channel processes, including both bed scour and lateral erosion, to only brief restriction of channel behavior early in the rise of the flooding. The watershed characteristic that appears to explain much of this variation is size of drainage area. (Woodard-USGS)
W79-00623

THERMAL STRESS NEAR THE SURFACE OF A GLACIER,
British Antarctic Survey, Cambridge (England).
Journal of Glaciology, Vol. 20, No. 83, p 257-283, 1978. 15 fig, 1 tab, 47 ref.

Descriptors: *Glaciers, *Ice, *Thermal stress, *Model studies, Temperature, Theoretical analysis, Analytical techniques, Cracks, Analysis, Thermal expansion, On-site data collections, Mathematical models, Stress analysis, Strain, Firn, Snow, *Barnes Ice Cap.

Stresses occur in the uppermost 10 m of a glacier as a result of temperature fluctuations at the surface. A model was set up of a typical year's surface temperature variation, and the progress of temperature waves through the glacier was calculated using Fourier theory of heat conduction. Short-period fluctuations are attenuated rapidly, and at 10 m depth the annual cycle is reduced to 5% of its surface amplitude. As the temperature of the ice varies, it undergoes small volume changes; stresses were calculated on the assumption that any tendency of the ice to expand or contract laterally results in the creation of just enough stress to cause the ice to remain unstrained. It was found that in the top 2 or 3 m, stresses of thermal origin are generally in excess of those due to gross deformation or overburden pressure. For the case of high-density ice, Glen's flow law was used, and conditions were found to be favorable for the formation of surface rumples of wavelength about 10 m. For the case of firn or snow, a Newtonian flow law was assumed, and it was found that under cold conditions, fracture under tension can occur. Cracks of thermal origin may be responsible for the initial formation of crevasses, and they also provide an explanation for background noise encountered when seismic shooting at low temperatures. Calculations were made of the strain-rate field surrounding a crack, and it was found that thermal effects can lead to appreciable strain-rate anomalies for strain-rate measurements near cracks. The magnitude of the effect is easily sufficient to account for anomalous fluctuating strain-rates found when using wire strainmeters on the Barnes Ice Cap. (Humphreys-ISWS)
W79-00686

ORIGIN OF FOLIATION IN GLACIERS,
Minnesota Univ., Minneapolis. Dept. of Geology and Geophysics.
R. L. Hooke, and P. J. Hudleston.
Journal of Glaciology, Vol. 20, No. 83, p 285-299, 1978. 4 fig, 45 ref. NSF GA-42728, EAR 74-12293-A02.

Descriptors: *Glaciers, *Glaciology, *Structural behavior, Ice, Model studies, Movement, Leaves, Homogeneity, Physical properties, Theoretical analysis, Mathematical models, Bubbles, Structural analysis, Distribution patterns, Spatial distribution, *Foliation.

Laboratory studies suggested that neither bubbles nor dirt particles migrate rapidly enough in glacier ice to be responsible for the alternating layers of bubbly and clear ice or dirty and clean ice which constitute foliation. It was suggested that these variations in bubble or dirt content are inherited from primary inhomogeneities such as may occur in sedimentary stratification in the accumulation region, in crevasse fillings, or during debris entrainment at the base of the glacier: the appearance of these inhomogeneities is later modified by strain during flow to produce foliation. The authors considered 6 types of inhomogeneity, or components of foliation, and they showed that, at the very large total strains expected in glaciers, all are eventually flattened, stretched out, and rotated to form a layered structure roughly perpendicular to the direction of maximum total shortening. Most characteristics of observed foliation can be explained by this hypothesis. For example, in the marginal zones of polar ice sheets, the rapid decrease in dip of foliation with depth and with distance up-glacier from the margin can be explained by a model in which the foliation is assumed to be nearly parallel to the base of the glacier some distance from the margin and is deformed passively with the ice thereafter. However, some observations of cross-cutting foliations may require localized inhomogeneous shear parallel to the 'new' foliation. (Humphreys-ISWS)
W79-00687

SURFACE MASS-BALANCE VARIABILITY NEAR 'BYRD' STATION, ANTARCTICA, AND

ITS IMPORTANCE TO ICE CORE STRATIGRAPHY,
Ohio State Univ., Columbus. Dept. of Geology and Mineralogy; and Ohio State Univ., Columbus. Inst. of Polar Studies.
I. M. Whillans.
Journal of Glaciology, Vol 20, No 83, p 301-310, 1978. 5 fig, 22 ref.

Descriptors: *Ice, *Antarctic, *Surfaces, *Stratigraphy, Snowpacks, Movement, Analysis, On-site tests, Variability, Analytical techniques, Oxygen isotopes, Glaciology, *Byrd Station(Antarctica), Mass balance.

The local variability in surface mass balance (net snow accumulation) up-glacier from 'Byrd' station, Antarctica, is due to the combined effects of year-to-year 'climate' variations and of the surface microrelief due to snow drifts and sastrugi. These variabilities are consistent with the variability in surface mass balance obtained from core stratigraphy. The variabilities were used in a discussion of the difficulties encountered with the deep 'Byrd' station core in detecting annual layering by the stable oxygen-isotope ratio and the microparticle concentration techniques. The recognition of annual layers by these techniques requires that the snows of certain seasons be present in the measured section; but near 'Byrd' station, the microrelief is such that summer snow layers are not horizontally continuous and may be absent from a given section. At other sites on ice sheets, where the microrelief is less (less wind activity) or where the surface mass balance is larger, or both, less difficulty is anticipated in using the stable oxygen-isotope ratio and microparticle-concentration techniques to identify annual layers. (Humphreys-ISWS)
W79-00688

THE SPATIAL DISTRIBUTION OF 10 M TEMPERATURES IN THE ANTARCTIC PENINSULA,
British Antarctic Survey, Cambridge (England).
P. J. Martin, and D. A. Peel.
Journal of Glaciology, Vol 20, No 83, p 311-317, 1978. 3 fig, 1 tab, 19 ref.

Descriptors: *Ice, *Antarctic, *Glaciers, *Temperature distribution, Temperature, Spatial distribution, Boreholes, Data collections, Air temperature, Correlation analysis, Climatic data, Air temperature.

Temperatures from 10 m bore holes were analyzed to determine the spatial variation of mean annual surface temperature over the Antarctic Peninsula. In general, there is a decrease in temperature of 0.84 deg per degree latitude southwards combined with an altitude lapse rate of 0.68 deg per 100 m. There is a sharp divide between the continental type climate of the east coast and a maritime climate of the central and western regions. Temperatures are approximately 7 deg lower along the east coast compared with those at sites of a similar altitude and latitude on the west. (Humphreys-ISWS)
W79-00689

ORIGIN OF THE BASAL ICE LAYER FROM ALPINE GLACIERS INDICATED BY ITS CHEMISTRY,
Brussels Univ. (Belgium). Lab. de Geomorphologie.
R. A. Souchez, and R. D. Lorrain.
Journal of Glaciology, Vol 20, No 83, p 319-328, 1978. 4 fig, 3 tab, 20 ref.

Descriptors: *Glaciers, *Ice, *Glaciology, *Geochemistry, Alpine, Calcium, Lead, Sodium, Potassium, Magnesium, Chemical analysis, On-site data collections, Sampling, Cations, Lead radioisotopes, Stratigraphy, Foreign countries, Foreign research, *Switzerland, *Glacier de Tsanfleuron(Switzerland), *Glacier d'Argentiere'(Switzerland), Basal ice.

The basal ice layer of Alpine glaciers, the thickness of which can reach more than 1 m, generally appears as a sequence composed of layers of bubble-poor ice 0.5-3 cm thick and dirt layers containing dispersed rock fragments. Locally, debris-free bubbly ice is also present in the sequence. This basal layer exists on the lee side of rock protuberances or along the marginal part of the glacier. Three geochemical characteristics shed some light on its origin: (1) The high calcium content of basal ice sliding over limestones from the north side of Glacier de Tsanfleuron can be predicted successfully from considerations of the phase relations in regelating subglacial solutions in approximate equilibrium with subglacial calcite deposits. (2) The (Na + K)/(Ca + Mg) ratio of bubble-poor basal ice from Glacier de Tsijiore Nouve which flows over gneissic rocks is significantly higher than this ratio in other samples taken in the same environment (glacier ice, melt water). This may be explained by refreezing of squeezed water, the ionic composition of which is governed by selective diffucion of ions during squeezing and/or by the water being forced through mud layers as demonstrated by us at the base of Glacier d'Argentiere. (3) The Lead-210 activity per kg of basal ice from the south side of Glacier de Tsanfleuron is greater than that of the glacier ice immediately above, which indicates that it is younger despite percolation effects. This can be explained if recent ice accretion has occurred at the base of relatively old glacier ice. Accretion of blowing snow has been found to occur under the southern margin of the glacier. (See also W76-05403) (Humphreys-ISWS)
W79-00690

DETERMINATION OF THE MEAN NUMBER OF BONDS PER SNOW GRAIN AND OF THE DEPENDENCE OF THE TENSILE STRENGTH OF SNOW ON STEREOLOGICAL PARAMETERS,
Eidgenossische Inst. fur Schnee- und Lawinenforschung, Davos (Switzerland).
H. Gubler.
Journal of Glaciology, Vol 20, No 83, p 329-341, 1978. 10 fig, 1 tab, 10 ref.

Descriptors: *Snow, *Tensile strength, *Mathematical models, Physical properties, Theoretical analysis, Density, Mechanical properties, Model studies, Analytical techniques, Laboratory tests, *Snow structure, Snow grains, Density distribution, Grain bonds.

A theoretical density distribution of the number of bonds per grain as a function of the mean number of bonds per grain was derived from the assumption of a randomness and isotropy of grain and grainbound location and orientation. The knowledge of the theoretical density distribution allows the determination of the effective distribution parameters from section planes or thin sections. The concept of the fundamental unit to describe the strength of snow was introduced. Structural parameters developed on the basis of the fundamental units show improved correlations with the tensile strength. (Humphreys-ISWS)
W79-00691

AN ALTERNATE STATISTICAL INTERPRETATION OF THE STRENGTH OF SNOW,
Eidgenoessiche Inst. fur Schnee- und Lawinenforschung, Davos (Switzerland).
H. Gubler.
Journal of Glaciology, Vol 20, No 83, p 343-357, 1978. 10 fig, 1 tab, 12 ref.

Descriptors: *Snow, *Strength, *Mechanical properties, *Statistical models, Ductility, Model studies, Mathematical models, Statistical methods, Analytical techniques, Distribution patterns, Cracks, Analysis, Foreign research, Brittle strength.

The basic features of the statistical models to describe brittle and ductile strength of snow were outlined and discussed. The concept of the 'fundamental unit' was introduced. The models were applied to estimate the development of slab stability during heavy snowfalls and to simulate measurements of the tensile strength of snow using the centrifugal method as a function of the load rate. The models developed were compared with Sommerfeld's applications of statistical methods to estimate the strength of snow in the starting zone of a slab avalanche. Statistical models to estimate the strength of snow together with consistent definitions of the fundamental unit may lead to a better understanding of brittle and ductile strength of snow in terms of structural or stereological parameters. (See also W74-02745 and W75-10651) (Humphreys-ISWS)
W79-00692

DIELECTRIC BEHAVIOUR OF DISPERSE ICE MICROCRYSTALS IN THE FREQUENCY RANGE 100,000 TO 0.01 HZ,
Laboratoire de Thermodynamique des Etats Metastables et de Physique Moleculaire, Pau (France).
C. Lafargue, S. Bourgeois, and G. Evrard.
Journal of Glaciology, Vol 20, No 83, p 359-365, 1978. 5 fig, 2 tab, 6 ref.

Descriptors: *Ice, *Laboratory tests, *Activation energy, Heating, Electromagnetic waves, Temperature, Frequency, Melting, Dispersion, Analysis, Testing procedures, *Dielectric properties, Microcrystals, Polycrystalline ice.

Dielectric properties of ice microcrystals were studied in the frequency range 300,000 to 0.01 Hz. Two separated dispersions were revealed: the Debye dispersion of ice and another dispersion at very low frequencies. Both dispersions present an aging effect, with decreasing activation energy for the Debye dispersion and with increasing activation energy for the second one. It was shown that the sum of these activation energies retains a constant value of (1.05 + or - 0.02) eV. (Humphreys-ISWS)
W79-00693

GLACIAL EROSION BY THE LAURENTIDE ICE SHEET,
Aberdeen Univ. (Scotland). Dept. of Geography.
D. E. Sugden.
Journal of Glaciology, Vol 20, No 83, p 367-391, 1978. 14 fig, 47 ref.

Descriptors: *Glaciology, *Erosion, *Canada, *Geomorphology, Glaciers, Ice, Geologic investigations, Glaciation, Geology, Topography, Freezing, Pleistocene epoch, Analysis, Methodology, Analytical techniques, Scour, Abrasion, Movement, Laurentide ice sheet, Ice flow.

The aim of the paper was to analyze landscapes of glacial erosion associated with the Laurentide ice sheet at its maximum and to relate them to the three main variables affecting glacial erosion, namely former basal thermal regime of the ice sheet, the topography of the bed, and the geology of the bed. The key to the analysis is the comparison of the distribution of landscape types with the simulated pattern of the basal thermal regime of the former ice sheet. Using lake-basin density as an indication of the intensity of glacial erosion, a zone of maximum erosion was identified. This zone forms a ring between the center of the former ice sheet and its periphery. This ring coincides with a zone where melt water from the ice-sheet center is calculated to have frozen on to the bottom of the ice sheet. This regelation incorporated basal debris into the ice, forming a basal layer 20-50 m thick, and afforded an efficient means of debris evacuation. A conceptual model was developed and was based upon the following postulates: (1) Landscapes of glacial erosion are related primarily to the basal thermal regime of the

ice sheet. (2) Landscapes of glacial erosion are equilibrium forms related to maximum glacial conditions. This implies that at some stage in the Pleistocene the Laurentide ice sheet was in a stable maximum condition for a long period of time. (3) Mechanisms allowing evacuation of debris rather than those of abrasion or fracture may be the most important in influencing the amount of erosion achieved by an ice sheet. (4) Cold-based ice may accomplish erosion if it contains debris. (Humphreys-ISWS)
W79-00694

FORMER ICE SHELVES IN THE CANADIAN HIGH ARCTIC,
Alberta Univ., Edmonton. Dept. of Geography.
J. England, R. S. Bradley, and G. H. Miller.
Journal of Glaciology, Vol 20, No 83, p 393-404, 1978. 5 fig, 1 tab, 42 ref. NSF OCD-00975.

Descriptors: *Ice, *Canada, *Geomorphology, *Dating, *Arctic, Glacial drift, Radioactive dating, Carbon radioisotopes, Stratigraphy, Amino acids, Age, On-site investigations, Quaternary period, *Ellesmere Island, Ice shelf.

Moraines deposited by the outermost ice advance across Judge Daly Promontory, northeastern Ellesmere Island, reflect thin, topographically controlled ice lobes extending to sea level. The termini of two ice lobes were investigated, and both produced ice shelves where they flowed into isostatically depressed embayments along western Kennedy Channel. Morphological evidence for these ice shelves occurs at the entrance to these valleys where steeply descending lateral moraines become abruptly horizontal for 2 km. In addition, both the horizontal moraines and associated proglacial terraces are fossilferous down-valley from the apparent grounding line. Based on the differences in elevation between the horizontal moraines and the valley bottoms, the two ice shelves had estimated thicknesses of 110 and 150 m. A proglacial outwash terrace at 175 m a.s.l. is considered to represent the approximate relative sea level during the formation and break-up of the ice shelves. This relative sea level is consistent with the water depths required to float the calculated ice thicknesses in both valleys. Associated with these ice margins are finite 14C dates of 28000-30000 B.P. and amino-acid age estimates of greater than 35000 B.P. The importance and likelihood of additional past ice shelves in the Canadian High Arctic was discussed. (Humphreys-ISWS)
W79-00695

RECORDING WIRE STRAINMETERS ON THE BARNES ICE CAP, BAFFIN ISLAND, CANADA,
Cambridge Univ. (England). Dept. of Geodesy and Geophysics.
K. Evans, D. J. Goodman, and G. Holdsworth.
Journal of Glaciology, Vol 20, No 83, p 409-423, 1978. 11 fig, 4 tab, 12 ref, 2 append.

Descriptors: *Ice, *Strain measurement, *Instrumentation, *On-site tests, *Canada, On-site investigations, Strain, On-site data collections, Strain gages, Rates, Analysis, Testing procedures, *Baffin Island(Canada), *Barnes Ice Cap, Ice caps.

The report described an experiment to evaluate the use of geophysical (Cambridge-type) wire strainmeters for the rapid acquisition of strain-rate data and to compare strains on a large ice mass over gauge distances of 5 m, 50 m, and 1 km. Three continuously recording wire strainmeters were installed at the center of two separate arrays of strain poles 10.6 km and 19.5 km from the ice divide on the Barnes Ice Cap. Data were collected between 24 April and 15 May 1976. The 1 km strain arrays had been measured previously in 1974 and 1975. The results showed good agreement between the strainmeter data and the larger strain arrays at the 10.6 km site, but results differed at the 19.5 km site. When the daily means were calculated for the strainmeters at the 19.5 km site, the strain-rates showed a possible periodic variation with an apparent period of about 11 d. Since there appears to be no direct correlation between the strainmeters signal and either temperature or pressure, the result was assumed to represent real varying strain within the ice. (Humphreys-ISWS)
W79-00696

AN INVESTIGATION INTO THE USE OF STRAIN ROSETTES FOR THE MEASUREMENT OF PROPAGATING CYCLIC STRAINS,
Scott Polar Research Inst., Cambridge (England).
V. A. Squire.
Journal of Glaciology, Vol 20, No 83, p 425-431, 1978. 6 fig, 11 ref.

Descriptors: *Strain measurement, *Sea ice, *Instrumentation, *On-site tests, Strain, Strain gages, Ice-water interfaces, Waves(Water), Analytical techniques, Analysis, Measurement, Gravity waves, Frequency, *Newfoundland, *Notre Dame Bay(Newfoundland), Strainmeter rosettes, Principal strain, Principal axes.

An investigation into the feasibility of using a strain rosette to measure the principal strains and to locate the principal axes for propagating strain wave was carried out for the particular application of a flexural-gravity wave in sea ice. It was found that the separation of the instruments in the rosette is extremely critical, and, for a physically realizable rosette, errors are unavoidable if strain is to be monitored continuously. An alternative approach was proposed employing frequency-domain analysis and in particular a running-power spectral density. The method was demonstrated with data obtained from strainmeters on fast ice in Notre Dame Bay, Newfoundland. Two distinct wave components were found to be present of period 6 s and 13 s, and it was shown with 99.9% confidence that they are propagating in different directions. (Humphreys-ISWS)
W79-00697

A MECHANICAL TEST PROCEDURE FOR AVALANCHE SNOW,
Beck (R. W.) and Associates, Denver, CO.
S. L. McCabe, and F. W. Smith.
Journal of Glaciology, Vol 20, No 83, p 433-438, 1978. 4 fig, 1 tab, 12 ref.

Descriptors: *Snow, *Strain measurement, *Instrumentation, *On-site investigations, On-site tests, Avalanches, Stress, Strain, Mechanical properties, Strength, Measurement, Methodology, Test procedures.

The design, construction, and testing of a portable constant strain-rate testing machine for determining the mechanical behavior of avalanche snow were described. The machine is intended for use in determining the stress-strain-time behavior of low-density natural snows in the field. A technique for making direct measurements of strain in the snow sample was described, and stress-stran curves were presented for strain-rates ranging from 0.000005 to 0.00005/s. The densities of the snow samples tested ranged from 186 to 335 kg/cu m. Ultimate-strength data and relaxation curves also were presented. In order to provide stress-strain-strain-rate data which will be useful for stress and deformation finite-element modelling of avalanche snow-packs, it will be necessary to conduct tests at lower strain-rates and for longer time periods. It also may be necessary to conduct tests with larger samples to avoid problems caused by the presence of flaws in the snow. (Humphreys-ISWS)
W79-00698

HEAT AND MASS TRANSPORT PROCESSES IN SUBSEA PERMAFROST I. AN ANALYSIS OF MOLECULAR DIFFUSION AND ITS CONSEQUENCES,
Alaska Univ., Fairbanks. Geophysical Inst.
W. D. Harrison, and T. E. Osterkamp.
Journal of Geophysical Research, Vol. 83, No. C9, p 4707-4712, September 29, 1978. 2 fig, 25 ref. NOAA 04-5-158-35, 04-6-158-44039, 04-7-158-44006 NSF DPP76-18399.

Descriptors: *Permafrost, *Alaska, *Heat transfer, *Mass transfer, *Model studies, *Arctic, Mathematical models, Oceans, Cold regions, Diffusion, Thawing, Temperature, Salinity, Salts, Bays, Shores, *Beaufort Sea(Alaska), *Prudehoe Bay(Alaska), *Subsea permafrost.

Some heat and mass transport processes in subsea permafrost were discussed. An exact solution was given for a coupled model in which both heat and salt are transported solely by diffusion. The model describes the development of a thawed layer beneath the seabed after an ocean transgression over deeply frozen ground and is a generalization of the well-known Stefan problem. A stability calculation indicated that such a diffusive regime should be unstable to convection of the interstitial water in the thawed layer after a critical thickness has been reached. The theory was compared with observations from two sites in the Beaufort Sea, Alaska. In western Elson Lagoon, near Barrow, the diffusive regime may be stable, but at Prudhoe Bay it is not, and interstitial water motion is important. At Prudhoe Bay the salt and heat transport regimes are convective and diffusive, respectively. (Sims-ISWS)
W79-00700

PROBABILITY ESTIMATE OF SNOW-COVER DEPTH DISTRIBUTION,
I. D. Kopanev.
Soviet Hydrology: Selected Papers, Vol. 15, No. 4, p 281-287, 1976. 2 fig, 8 tab, 14 ref. Translated from Trudy Glavnoi Geofizicheskoi Observatorii, No. 349, p 3-15, 1976.

Descriptors: *Snow cover, *Depth, *Probability, *Distribution patterns, Snow, Snow surveys, Data processing, Analytical techniques, Forests, Snowfall, Statistica, Variability, Water resources, *USSR.

Snow cover distribution in a particular region is determined by many factors, which cannot always be taken into account quantitatively. Statistical, along with physical methods, have been used extensively in recent years to solve many scientific and practical problems in hydrometeorology. An extensive literature is devoted to snow cover distribution in the USSR, mainly to its average and extreme characteristics. Not only data on average snow cover depth, but also on its probability in a particular area are required to satisfy the demands of many branches of the national economy. Data on snow cover distribution in the USSR are given in the 35 volumes of the Climatic Handbook of the USSR for individual points. It is difficult to use this extensive and disconnected information on snow cover for practical and scientific purposes. Snow cover dpeth distributions were analyzed over the territory of the Northwestern Hydrometeorological Service Aministration by mathematical statistics. To this end, snow survey data were used for the period of 1935-1964 at 142 stations. Of these, 93 stations performed snow surveys in the field and 49 stations in the forest and in forest clearings. This analysis of the data showed that the snow cover distribution in the territory of the Northwestern Hydrometeorological Service Administration is normal. (Sims-ISWS)
W79-00705

KOLYMA WATER BALANCE STATION, MAGADAN OBLAST, NORTHEAST U.S.S.R.: UNITED STATES-SOVIET SCIENTIFIC EXCHANGE VISIT,
Forest Service (USDA), College, AK. Inst. of Northern Forestry.
For primary bibliographic entry see Field 4D.
W79-00716

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF: PROGRAM WORK STATEMENTS FISCAL YEAR 1978, VOLUME I.
National Oceanic and Atmospheric Aministration, Boulder, CO. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W79-00895

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF: PROGRAM WORK STATEMENTS FISCAL YEAR 1978, VOLUME II.
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W79-00896

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF: PROGRAM WORK STATEMENTS FISCAL YEAR 1978, VOLUME III.
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W79-00897

2E. Streamflow and Runoff

STATISTICAL SUMMARY OF STREAMFLOW DATA FOR KANSAS STREAMS IN THE ARKANSAS RIVER BASIN,
Geological Survey, Lawrence, KS. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00626

FLOODS IN KANSAS CITY, MISSOURI AND KANSAS, SEPTEMBER 12-13, 1977,
Geological Survey, Rolla, MO. Water Resources Div.; and Geological Survey, Topeka, KS. Water Resources Div.
For primary bibliographic entry see Field 4A.
W79-00638

STREAMS AND DRAINAGE BASINS, FULTON COUNTY, NEW YORK,
Fulton County Planning Dept. Johnstown, NY.
For primary bibliographic entry see Field 4A.
W79-00664

STREAMFLOW MODELING OF UPPER INDUS RIVER CATCHMENTS,
Asian Inst. of Tech., Bangkok (Thailand). Div. of Water Resources Engineering.
For primary bibliographic entry see Field 4A.
W79-00800

A MOISTURE-ACCOUNTING WATERSHED MODEL FOR SINGLE-STORM EVENTS BASED ON TIME-AREA CONCEPT,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2A.
W79-00813

AN EXPERIMENTAL STUDY OF FLOW AND OXYGEN TRANSFER IN CIRCULATION INDUCED BY AIR BUBBLE PLUMES,
New Hampshire Univ., Durham. Dept. of Chemical Engineering.
C. J. Wen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 388, Price codes: A10 in paper copy, A01 in microfiche. Master of Science Thesis, June 1974. 195 p, 79 fig, 7 tab, 45 ref, 7 append. OWRT A-030-NH(3), 14-31-0001-3829.

Descriptors: Absorption, *Mixing, Oxygen, *Water circulation, Water quality, Air movement, Circulation, *Aeration, Dissolved oxygen, Measurement, Mass transfer, Model studies, Jets, Velocity measurement, Manifolds, *Vertical plumes, *Oxygen transfer, *Air bubble plumes, *Mixing device.

Experimental studies of the patterns of circulation and flow induced by aeration from point and line sources submerged in water have been carried out in the laboratory. The influence of the system variables such as aerator design, water depth and air supply rate, on the induced flow were studied. Efforts were made to extend and clarify the work of previous similar studies for aeration from linear systems. The experimental results are generally in good agreement with those obtained by previous investigators. The ratio of induced water discharge relative to air discharge as a measure of aeration efficiency has been examined and found to increase with manifold submergence depth and decrease with increasing air discharge rate within certain limits. A comparison of the induced flow patterns between the plane water jet and linear air bubble plume system has been made. In addition, an efficiency criterion for comparing these two systems was proposed for a given set of conditions. Measurements are presented of the transfer rate of dissolved oxygen in water from rising air bubbles released from a linear manifold. A simple mass transfer model successfully correlates the data with only one lumped constant which is a function primarily of aeration rate and manifold characteristics.
W79-00856

A FLASH FLOOD AID - THE LIMITED AREA QPF,
National Weather Service, Fort Worth, TX. Southern Region.
For primary bibliographic entry see Field 2B.
W79-00994

2F. Groundwater

A GROUNDWATER RECHARGE MODEL AND APPLICATION TO A SMALL WATERSHED,
Nebraska Univ., Lincoln.
D. M. Manbeck, and M. Arbab.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 118, Price codes: A04 in paper copy, A01 in microfiche. Nebraska Water Resources Center Project Completion Report, September 1977. 60 p, 15 fig, 3 tab, 26 ref, 1 append. OWRT A-042-NEB(1).

Descriptors: *Mathematical models, *Watersheds(Basins), *Groundwater movement, *Groundwater recharge, *Nebraska, *Runoff, Soil moisture, Evapotranspiration, Soil water movement, Percolation, Soil water, Equations, Water table, Precipitation(Atmospheric), Irrigation, Computer models, Simulation analysis, Test wells, Groundwater resources, Forecasting.

A mathematical simulation model for tracing the movement of precipitation from soil surface to the groundwater table was developed. Required input for the model includes: mean monthly air temperature, monthly precipitation, and soil moisture characteristics. It applies a series of deterministic equations to relate precipitation to infiltration, compute surface runoff, evapotranspiration, deep percolation, and the recharge to the groundwater zone. The model can be used to determine the amount of water from precipitation and irrigation which moves vertically downward from one soil level to the next on a monthly basis for various initial soil conditions. The model was applied to simulate conditions of a small watershed in southeastern Nebraska. The simulation predictions of runoff, evapotranspiration, moisture profile, and groundwater recharge. However, because of inavailability of observed data, only computed runoff was compared to the observed and found to match closely. Groundwater level observations in the area were used to check the computed recharge to the groundwater zone but they were found to be more than the model. This is due to groundwater flow, which moves from high water table areas towards the natural streams in the northern part of the watershed area where the observation well is located. (Majtenyi-IPA)
W79-00508

DOLOMITIZATION IN THE FLORIDAN AQUIFER,
Florida Univ., Gainesville. Dept. of Geology.
A. F. Randazzo, and E. W. Hickey.
In: Proceedings, Second International Symposium on Water-Rock Interaction, Strasbourg, August 17-25, 1977. p 182-191, 1 fig, 2 tab, 18 ref. Centre National de la Recherche Scientifique, Strasbourg, France. OWRT B-032-FLA(2), 14-34-0001-7148.

Descriptors: *Groundwater movement, Porosity, Permeability, Groundwater resources, *Limestones, Petrography, Water management(Applied), *Aquifers, Facies, *Diagenesis, *Florida, *Dolomitization.

Lithofacies, representing multiple transgressive-regressive cycles of sedimentation, characterize 20 cores penetrating the Floridan Aquifer. Original texture is preserved more frequently in rocks deposited in a supratidal environment and replaced by stoichiometric dolomite. Nonstoichiometric dolomite commonly is associated with obscured or obliterated limestone fabrics. Strontium in both dolomite groups generally is less than 200 ppm and indicates crystallization in a solution less saline than seawater. Dolomitization continued with time as rocks of supratidal and other environments of the area were subjected to repeated lateral migrations of a salt water - fresh water interface and phreatic groundwater conditions. (Morgan-Florida)
W79-00532

AVAILABILITY AND QUALITY OF GROUND WATER IN THE WINSTON AREA, DOUGLAS COUNTY, OREGON,
Geological Survey, Portland, OR. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00620

TOWARD A RATIONAL DEVELOPMENT OF ARTIFICIAL-RECHARGE RESEARCH,
Geological Survey, Lubbock, TX. Water Resources Div.
For primary bibliographic entry see Field 4B.
W79-00632

OCCURRENCE, QUALITY, AND AVAILABILITY OF GROUND WATER IN JONES COUNTY, TEXAS,
Texas Dept. of Water Resources, Austin.
R. D. Price.
Report 215, April 1978. 246 p, 40 fig, 12 tab, 60 ref.

Descriptors: *Texas, *Groundwater, *Groundwater availability, *Water quality, *Data collections, Aquifers, Census, Water wells, Well data, Groundwater resources, Hydraulic properties, Chemical analysis, Drillers logs, Springs, Geology, Irrigation wells, Water level fluctuations, Aquifer characteristics, Dissolved solids, Climatology, Groundwater recharge, Geologic formations, *Jones County(Texas), Chemical quality, Seymour formation, Choza formation, Vale formation, San Angelo formation.

The scope of this project included the collection, compilation, and analysis of data pertaining to the distribution and quality of groundwater in the county. Special emphasis was placed on determin-

ing the sources of water suitable for municipal, industrial, irrigation, domestic, and livestock use. Areas and possible sources of present or potential groundwater contamination were delineated. Jones County, with an areal extent of approximately 950 sq mi, is located in north-central Texas. The most reliable source of usable-quality groundwater in Jones County is the Seymour Formation which yields fresh to moderately saline waters in small to moderate quantities. The chemical analyses of water samples indicated that only a few scattered areas of Jones County produce groundwaters that meet the chemical quality standards recommended for public supplies by the U.S. Public Health Services. The water commonly have a high content of sulfate, nitrate, chloride, and dissolved solids. To further evaluate the future effects of heavy irrigation or industrial pumpage from the various aquifers, a network of 19 observation wells has been established in which water levels are planned to be measured and recorded annually. (Humphreys-ISWS)
W79-00709

CALCULATION OF DAILY GROUNDWATER LEVELS IN SWAMPS USING METEOROLOGICAL DATA,
For primary bibliographic entry see Field 4B.
W79-00715

2G. Water In Soils

EFFECTS OF SOIL INJECTION OF LIQUID DAIRY MANURE ON THE QUALITY OF SURFACE RUNOFF,
Kentucky Water Resources Research Inst., Lexington.
For primary bibliographic entry see Field 5B.
W79-00528

INFLUENCE OF WATER AND FERTILIZER MANAGEMENT ON YIELD AND WATER-INPUT EFFICIENCY OF CORN,
Florida Univ., Quincy.
For primary bibliographic entry see Field 5B.
W79-00530

SOIL WATER MOVEMENT AND UPTAKE BY PLANTS DURING WATER INFILTRATION AND REDISTRIBUTION,
Florida Univ., Gainesville. Dept. of Soil Science.
H. M. Selim, L. C. Hammond, and R. S. Mansell.
Soil and Crop Science Society of Florida Proceedings, Vol. 36, p 101-107, November 16-18, 1976. 13 fig, 14 ref. OWRT A-034-FLA(1), 14-34-0001-8010.

Descriptors: *Irrigation efficiency, *Deep sands, *Controlled root-zone wetting, Evapotranspiration, Drainage, Subsurface asphalt barrier, Water storage, Deep water seepage, Two-layered soils, *Soil water movement, Infiltration, *Redistribution(Plants), Vegetation.

A numerical solution of the equation governing soil water movement and uptake by plants during infiltration and redistribution was used to investigate the influence of the amount of irrigation and soil nonuniformity on deep seepage loss and soil water storage in the root zone. For a uniform Lakeland sandy soil the deep seepage loss increased as the amount of water applied in an irrigation event increased. However, the presence of a low permeability lower layer in a two-layered soil profile was beneficial in increasing soil water storage and in minimizing deep seepage loss. Such a decrease in deep seepage loss was more pronounced when large amounts of irrigation were applied and the hydraulic conductivity of the lower layer was extremely small. For small irrigations, the influence of a low permeability lower layer on deep seepage loss was essentially negligible. (Morgan-Florida)
W79-00535

CHANGES IN THE CHARACTER OF MEADOW PLANT COMMUNITIES INDUCED BY THE OVERFLOW AND STAGNATION OF SALT WATER, (IN POLISH),
Polish Academy of Sciences, Krawkow. Inst. Uprawy Roli Roslin.
For primary bibliographic entry see Field 5B.
W79-00610

FIELD DETERMINATION OF VERTICAL PERMEABILITY TO AIR IN THE UNSATURATED ZONE,
Geological Survey, Lubbock, TX. Water Resources Div.
E. P. Weeks.
Available from Supt. of Documents, GPO, Washington, DC 20402, Price $1.90. Professional Paper 1051, 1978. 41 p, 12 fig, 6 tab, 50 ref.

Descriptors: *Permeability, *Hydraulic conductivity, *Zone of aeration, *Atmospheric pressure, *Analog models, Infiltration, Soil water movement, Absorption, On-site investigations, Evaluation, *Unsaturated zone.

The vertical permeability to air of layered materials in the unsaturated zone may be determined from air pressure data obtained at depth during a period when air pressure is changing at land surface. Such data may be obtained by monitoring barometric pressure with a microbarograph or surveying altimeter and simultaneously measuring down-hole pneumatic head differences in specially constructed piezometers. These data, coupled with air-filled porosity data from other sources, may be compared with the results of electric-analog or numerical solution of the one-dimensional diffusion equation to make a trial-and-error determination of the air permeability for each layer. The permeabilities to air may in turn be converted to equivalent hydraulic conductivity values if the materials are well drained, are permeable enough that the Klinkenberg effect is small, and are structurally unaffected by wetting. The method offers potential advantages over present methods to evaluate sites for artificial recharge by spreading; to evaluate ground-water pollution hazards from feedlots, sanitary landfills, and land irrigated with sewage effluent; and to evaluate sites for temporary storage of gas in the unsaturated zone. (Woodard-USGS)
W79-00624

MAGNETIC RELAXATION STUDY OF WATER MOBILITY IN CLAY MINERALS,
North Dakota Univ., Grand Fork.
J. J. Schneider, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 316, Price codes: A03 in paper copy, A01 in microfiche. M.S. Thesis, August 1977, 36 p, 15 fig, 2 tab, 15 ref. OWRT A-051-NDAK(1), 14-34-0001-7072.

Descriptors: *Soil moisture, Absorbed water, Soil physical properties, Calcium, Montmorillonite, Kaolin, Pulse nuclear, *Magnetic resonance, *Clays, Sodium.

Longitudinal and transverse relaxation rates of the protons of water molecules adsorbed by Na- and Ca-montmorillonite and untreated kaolin were measured by use of the pulse NMR technique. The Na-montmorillonite and kaolin samples contained 10% and 60% water by weight and the Ca-montmorillonite samples contained 20% and 60% water. The montmorillonite samples were studied between +20C and -136C and the kaolin samples between +20C and -30C. The longitudinal relaxation of the kaolin samples was exponential above 0C and distinctly non-exponential below 0C. The transverse relaxation of the kaolin samples was approximately exponential both above and below 0C but decreased considerably when the samples were cooled through 0C. Such behavior suggests a partial freezing of the absorbed water at 0C. For the montmorillonite samples no discontinuous variation in the relaxation was observed as the temperature was lowered. The longitudinal relaxation was approximately exponential at the highest temperatures and became increasingly nonexponential as the temperature was lowered. Below -30C the relaxation was resolved into two exponential components, although it could probably be described by using more than two exponential terms. The short, long and average longitudinal relaxation times for all montmorillonite samples went through minima between -50C and -60C. The values of the relaxation times at the minima are smaller than would be expected due to nuclear dipole-dipole interactions alone and are explained in terms of the effect of paramagnetic impurities. Correlation times and activation energies for the protonic motion and relaxation times of the paramagnetic centers have been obtained from the proton longitudinal relaxation. The transverse relaxation of the montmorillonite samples was approximately exponential at all temperatures. T2 appeared to approach a temperature independent maximum value at high temperatures and a rigid lattice value at low temperatures. After corrections for the high temperature effect, activation energies were calculated from linear portions of the T2 curves.
W79-00679

INVESTIGATION OF THE LIQUEFACTION POTENTIAL AT THE W.G. HUXTABLE PUMPING PLANT SITE,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Soils and Pavements Lab.
For primary bibliographic entry see Field 8D.
W79-00713

THE ADSORPTION-DESORPTION OF DIURON BY FRESHWATER SEDIMENTS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W79-00860

FIELD CHAMBER MEASUREMENTS OF CO2 FLUX FROM SOIL SURFACE,
Kansas State Univ., Manhattan. Evapotranspiration Lab.
For primary bibliographic entry see Field 2K.
W79-00871

GALERKIN METHOD FOR A NON-LINEAR PARABOLIC EQUATION WITH MIXED NONLINEAR BOUNDARY CONDITIONS,
California Univ., Santa Barbara. Coll. of Engineering.
J. M. Sloss, J. C. Bruch, Jr., and G. Zyvoloski.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 429, Price codes: A04 in paper copy, A01 in microfiche. College of Engineering Report UCSB-ME-77-1, (1977). 62 p, 9 ref. (California Water Resources Center Project UCAL-WRC-W-336) (OWRT-A-039-CAL(15).

Descriptors: Computer programs, *Mathematical studies, *Approximation methods, *Galerkin method, *Equations, Porous media, *Unsteady flow, *Crank-Nicolson approximation, Boundary processes, Interfaces.

Error estimates are derived for a numerical scheme for finding an approximate solution to nonlinear parabolic equations in the plane with mixed nonlinear boundary conditions. The scheme involves the Galerkin method coupled with successive substitutions and the Crank-Nicolson approximation. Problems of this type arise when considering unsteady, unsaturated flows in porous media. (Snyder-Calif, Davis)
W79-00900

NMR INVESTIGATION OF MOBILITY OF WATER SORBED BY CLAY MINERALS,
North Dakota Univ., Grand Forks.
For primary bibliographic entry see Field 2K.
W79-00910

POLYCHLORINATED BIPHENYLS, CHLORINATED PESTICIDES AND TRACE METALS IN SOILS OF THE EVERGLADES NATIONAL PARK AND ADJACENT AGRICULTURAL AREAS,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Atmospheric Labs.
For primary bibliographic entry see Field 5B.
W79-00934

A SIMULATION MODEL FOR LEAD MOVEMENT IN A WATERSHED,
Illinois Univ. at Urbana-Champaign. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5B.
W79-00954

2H. Lakes

NUTRIENT INPUTS AND ALGAL BLOOMS IN IOWA LAKES,
Iowa State Univ., Ames. Dept. of Animal Ecology.
For primary bibliographic entry see Field 5C.
W79-00510

DEVELOPMENT OF AN OPERATIONAL NORTHERN AQUATIC ECOSYSTEM MODEL,
Alaska Univ., College. Inst. of Water Resources.
R. F. Carlson, P. M. Fox, and J. D. LaPerriere.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 310, Price codes: A02 in paper copy, A01 in microfiche. Report No. IWR-82, June 1977. 10 p. OWRT C-6169(No. 5217)(1), 14-31-0001-5217.

Descriptors: *Model studies, *Ecosystems, *Lakes, *Alaska, *Water resources development, Water resources management, Limnology, Iced lakes, Ice cover, Ice breakup, Hydroelectric power, Fish hatcheries, Evaluation, Computer models, Simulation, Aquatic environment, Aquatic life, Climatology, Sampling.

Adaptation of a pre-existing model ecosystem was studied for application to management problems of Northern lakes and suggestions were made for appropriate strategy for simulating aquatic ecosystems in cold regions. Harding Lake was used as a case study because it is easily accessible, located 80 km southeast of Fairabanks. Also, it is a rather large, deep subarctic lake and provide good field data for the modeling project. Areas of interest included general constituent levels, certain aspects of lake geometry, and climatic conditions. Spring breakup is a very important season in artic limnology, yet is difficult to simulate because of the unstable nature of the water column during that period. Other weaknesses of the simulation involve other ice-related phenomena, the biological portion of the model, and the difficulty in detecting errors because of shielding by internal interaction. However, many of these problems were solved and the model was adapted for use on northern lakes. Potential applications for the model were identified, including reservoirs of a large hydroelectric project in southcentral Alaska, a salmon hatchery supply lake, and other lake and reservoir management schemes throughout the state.
W79-00513

EFFECTS OF MECHANICAL MIXING IN RESERVOIRS ON SEASONAL AND ANNUAL GROWTH RATES OF FISHES,
Oklahoma State Univ. Stillwater. School of Biological Sciences.
G. E. Gebhart, and M. D. Clady.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 334, Price codes: A03 in paper copy, A01 in microfiche. Oklahoma Water Resources Research Institute, Final Technical Completion Report, December 1977. 42 p, 1 fig, 21 tab, 32 ref. OWRT A-069-OKLA(1).

Descriptors: *Destratification, *Mixing, *Lakes, *Fish, *Fish conservation, *Habitats, *Habitat improvement, Oklahoma, Nutrients, Channel catfish, Freshwater fish, Gizzard shad, White crappie, White bass, Ecology, Water quality, Surveys, Evaluation, Aquatic environment, Reservoirs.

The effect of mechanical mixing carried out on Lake Arbuckle, Oklahoma, in 1977, was investigated by measuring seasonal and annual growth rates of fish. In 1976 and in 1977 after mixing, fish were taken using gill nets, and scales and spines were examined to reveal the effect on growth rates. The mixing attempt to destratify the reservoir and improve fish environment did increase the habitat available to the fish. Seasonal growth rates of gizzard shad and channel catfish, which are bottom feeders, were greater during the destratified period when more of the bottom area was available for feeding. Pelagic feeders like white crappie and white bass were less adversely affected by the loss of bottom habitat. Mechanical mixing increased the amount of available fish habitat in late summer which probably benefited growth, but the best growth occurred when available fish habitat was expanded in early summer. To maximize growth, mixing should begin in early May with the objective of preventing vertical stratification.
W79-00514

PRODUCTIVITY OF OEDOGONIUM IN LAKE WINGRA, WISCONSIN,
Texas Christian Univ., Fort Worth. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W79-00522

MICROBIOLOGICAL STUDY OF A HYPERSALINE LAKE IN FRENCH SOMALILAND,
Centre Hospitalo-Universitaire-Poitiers (France). Bacteriology Virology Lab.
For primary bibliographic entry see Field 5C.
W79-00523

DETRITUS IN THE LAKE ECOSYSTEM,
Connecticut Univ., Storrs. Biological Sciences Group.
For primary bibliographic entry see Field 5C.
W79-00552

FOOD SIZE SELECTION AND SEASONAL SUCCESSION OF FILTER FEEDING ZOOPLANKTON IN AN EUTROPHIC LAKE,
Warsaw Univ. (Poland). Dept. of Hydrobiology.
For primary bibliographic entry see Field 5C.
W79-00554

ENZYMATIC RELEASE OF PHOSPHATE IN WATER FROM SUBARCTIC LAKES IN NORTHERN SWEDEN,
Uppsala Univ. (Sweden). Inst. of Limnology.
For primary bibliographic entry see Field 5C.
W79-00559

THE OCCURRENCE OF INTERNAL PHOSPHORUS LOADING IN TWO SMALL, EUTROPHIC GLACIAL LAKES IN NORTHEASTERN OHIO,
Kent State Univ., OH. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W79-00560

NUTRIENT LIMITATION OF PHYTOPLANKTON IN A CENTRAL ARIZONA RESERVOIR,
Arizona State Univ., Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 5C.
W79-00562

AMMONIA-NITROGEN EXCRETION IN DAPHNIA PULEX,
North Dakota State Univ., Fargo. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W79-00563

SESTON DYNAMICS AND TRIPTON SEDIMENTATION IN THE PELAGIC ZONE OF A SHALLOW EUTROPHIC LAKE,
Wisconsin Univ.-Madison. Lab. of Limnology.
For primary bibliographic entry see Field 5C.
W79-00567

A MODEL OF RENEWABLE RESOURCES AND LIMITATION OF DEPOSIT-FEEDING BENTHIC POPULATIONS,
State Univ. of New York at Stony Brook. Dept. of Ecology and Evolution.
For primary bibliographic entry see Field 5C.
W79-00575

ACID LAKE RENOVATION,
Peabody Coal Co., Central City, KY. Regional Lab.
For primary bibliographic entry see Field 5G.
W79-00576

PIGMENT DIVERSITY IN FRESHWATER PHYTOPLANKTON. II. SUMMER-SUCCESSION IN THREE DUTCH LAKES WITH DIFFERENT TROPHIC CHARACTERISTICS,
Amsterdam Univ. (Netherlands). Limnological Lab.
For primary bibliographic entry see Field 5C.
W79-00595

ALGAE OF BIOLOGICAL PONDS OF THE CHERKASSY CHEMICAL INDUSTRY (IN UKRANIAN),
Cherkasskii Pedagogical Inst. (USSR). Div. of Botany.
For primary bibliographic entry see Field 5C.
W79-00611

HYDROLOGIC RECONNAISSANCE OF TSALA APOPKA LAKE, CITRUS COUNTY, FLORIDA,
Geological Survey, Orlando, FL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00639

UTAH LAKE-JORDAN RIVER HYDROLOGIC BASINS WATER QUALITY MANAGEMENT STUDY. VOLUME I.
Templeton, Linke and Alsup, Salt Lake City, UT.; and Engineering Science, Inc., Berkeley, CA.
For primary bibliographic entry see Field 5G.
W79-00660

THE CHEMICAL COMPOSITION AND HYDROCHEMICAL REGIME OF THE WATER IN LAKE VIITNA LINAJARV (IN ESTONIAN),
Akademiya Nauk Estonskoi SSR, Tartu. Inst. of Zoology and Botany.
For primary bibliographic entry see Field 5C.
W79-00662

EFFECTS OF A COASTAL FRONT ON THE DISTRIBUTION OF CHLOROPHYLL IN LAKE TAHOE, CALIFORNIA-NEVADA,
California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 5B.
W79-00699

GREAT LAKES WATER LEVELS 1974. DAILY AND MONTHLY AVERAGE WATER SURFACE ELEVATIONS.
National Ocean Survey, Detroit, MI. Lake Survey Center.
For primary bibliographic entry see Field 7C.
W79-00706

ECOLOGICAL AND PHYTOHISTORICAL INVESTIGATIONS OF LOWLAND BOG PLANT BIOTOPES OF OMBROTROPHIC BOG WITH SPECIAL RESPECT TO ITS POOLS AND LAKES IN NORTHWESTERN GERMANY, (IN GERMAN),
Kiel Univ. (West Germany). Botanisches Inst.
For primary bibliographic entry see Field 5C.
W79-00732

STUDIES ON A SALINE LAKE ECOSYSTEM,
Australian National Univ., Canberra. Dept. of Environmental Biology.
K. F. Walker.
Aust J Mar Freshwater Res. 24(1), p 21-71, 1973.

Descriptors: Anabaena-spiroides, Bacteria, Brachionus-plicatilis, Chroococcus, Ciliates, Climates, *Ecosystem, Energy, Evaporation flux, Gull, Gymnodinium-aeruginosum, Hexarthra-jenkinae, Insects, Lakes, Minerals, Necterosoma-penicillatum, Primary productivity, Rainfall, *Saline lakes, *Australia(Victoria), Tanytarsus-barbitarsis, Temperature, Trophic levels.

A descriptive study was made of a saline crater lake over 3 yr (1968-1970). Lake Werowrap is associated with the Red Rock scoria cone, western Victoria, Australia. Meteorological data were used to compute the hydrological and analytical energy budgets for 1969 and 1970. The main determinant of variations in lake salinity and volume was the evaporation/rainfall balance, although groundwater seepage also was implicated. The average rate of water renewal was 0.725 times per year. The annual heat budgets of the lake (mean, 1712 g cal/cm2) and the lake sediments (mean, 1218 g cal/cm2) were very small fractions of the total energy fluxes within the system. Energy fluxes were governed mainly by incident radiation, evaporation, back-radiation and sensible heat transfer. Chemically, the lake water is highly alkaline (pH 9.8), predominantly of sodium 'chlorocarbonate' composition, and showed stable ionic proportions despite salinity fluctuations. Inorganic N and P concentrations were high and influenced seasonally by a gull population breeding on a msall islet in the lake. Optical measurements indicated rapid light attenuation due to dissolved organic material and dense plankton populations. Considerable bacterial activity was indicated by high rates of 'dark' carbon-14 assimilation. Attention was given to the population dynamics of the rotifer Brachionus plicatilis, the dominant zooplankter, which attained peak densities in summer and autumn. Other zooplankton species included the rotifer Hexarthra jenkinae, 2 ciliates and larvae of aquatic and terrestrial insects, notably the dytiscid Necterosoma penicillatum, which occurred around the lake margins. The benthis community consisted solely of the chrionomid Tanytarsus barbitarsis.--Copyright 1974, Biological Abstracts, Inc.
W79-00734

SESTON AND SEDIMENT FORMATION IN FIVE LAKE DISTRICT LAKES,
Freshwater Biological Association, Ambleside (England).
For primary bibliographic entry see Field 5C.
W79-00738

COLONIAL BIRDS NESTING ON MAN-MADE AND NATURAL SITES IN THE U.S. GREAT LAKES,
Northwestern Michigan Coll., Traverse City.
W. C. Scharf.
Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. Technical Report D-78-10 and FWS/OBS-78/15, May 1978. 328 p, 32 tab, 25 fig, 34 ref, 5 append.

Descriptors: *Birds, *Great Lakes, Habitats, *Nesting, *Vegetation, Islands, *Colonial birds, Dredged material.

Habitats and nesting populations of colonial nesting birds of the U.S. Great Lakes were determined by aerial census, ground nest observations, and vegetation analysis during 1976 and 1977. Thirteen species at 267 colonies were found. An atlas of nesting sites and populations of colonies is provided. Intensive vegetation and habitat studies were performed on 24 sites: 8 natural islands and 16 dredged material locations. A greater percentage of cover by herbaceous vegetation was favored by ring-billed gulls and herring gulls, but common and Caspian terns perferred less vegetative cover. Both ciconiiform and larid colonial nesters killed or badly stressed vegetation supporting, surrounding, and below their nests. Soil analysis showed high levels of macronutrients in most colonies except to a few adapted plant species frequently found in heavily fertilized ring-billed gull colonies. Colony size and previous experience of breeders seemed more important than latitude in determining date of peak hatching and chronological sequence of nesting in ring-billed gulls. The water table affected nesting success by changing vegetation from hydric to xeric seres. (WES)
W79-00765

MACROINVERTEBRATES AND DIATOMS ON SUBMERGED BOTTOM SUBSTRATES, LAKE POWELL,
New Mexico Univ., Albuquerque. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W79-00782

THE DISTRIBUTION OF AQUATIC WEEDS IN THE FINGER LAKES OF NEW YORK STATE AND RECOMMENDATIONS FOR THEIR CONTROL,
Eisenhower Coll., Seneca Falls, NY. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W79-00787

PHYTOPLANKTON PRODUCTIVITY IN TOMAHAWK LAGOON, LAKE WAIPORI AND LAKE MAHINERANGI,
Otago Univ., Dunedin (New Zealand). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W79-00799

THE KNOWLEDGE OF THE PLANKTON OF LAKES OF GREECE: III. THE ZOOPLANKTON OF LAKE VENGORITIS. (IN GERMAN),
For primary bibliographic entry see Field 5C.
W79-00808

PHYTOPLANKTON FROM WATERS OF KANEM (CHAD): IX. THE APPLICATION OF CORRESPONDENCE FACTORIAL ANALYSIS TO POPULATION STUDIES, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Djamena (Chad). Dept. of Hydrobiology.
A. Iltis, and M. Roux.
Cah O R S T O M Ser Hydrobiol. 8(2), p 93-104, 1974.

Descriptors: Anabaenopsis-arnoldii, *Chad, Flora, Kanem, Oscillatoria-platensis, Phytoplankton, Pond, Alkaline water.

Samples (171) of the saline waters of Kanem were studied by means of correspondence factorial analysis. The present taxa and samples of permanent waters are distributed in 3 great groups. In temporary ponds, 3 kinds of samples are distinguishable: samples taken during the beginning or the end of the flood period; samples with Oscillatoria platensis predominant and samples with Anabaenopsis arnoldii predominant. The affinities between the flora of temporary ponds and that of the most saline permanent lakes are confirmed. (See also W76-09596; W75-09020 and W75-06778) Copyright 1975, Biological Abstracts, Inc.
W79-00849

DIURNAL STRATIFICATION OF DEEP WATER IMPOUNDMENTS,
Missouri Univ., Rolla. Dept. of Mechanical and Aerospace Engineering.
B. F. Armaly, and S. P. Lepper.
The American Society of Mechanical Engineers, New York, N.Y. Reprint No 75-HT-35, 1975. 9 p. OWRT A-080-MO(2). 14-31-0001-4025.

Descriptors: Reservoirs, *Diurnal, *Temperature distribution, *Thermocline, *Stratification, *Impoundments, *Solar energy, Model studies.

The diurnal temperature distribution in a deep water impoundment which is exposed to heating and cooling loads by convection, evaporation and radiation is examined. The diurnal behavior of the solar load, directional and spectral, is used with the selective attenuation and reflection characteristics of the water to account for the internal solar energy absorption rate. Simple atmospheric and water attenuation models were used to examine and simulate the diurnal behavior. The results demonstrate the stratification developments of the reservoir and indicate that in some cases deep layer responds continuously to the diurnal fluctuations of surface energy loads.
W79-00874

ENTRAINMENT AT A ONCE-THROUGH COOLING SYSTEM ON WESTERN LAKE ERIE,
Michigan State Univ., East Lansing. Inst. of Water Research; and Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W79-00878

PHYTOPLANKTON FROM ALKALINE WATERS OF KANEM (CHAD): VIII. CLASSIFICATION OF ENVIRONMENTS STUDIED AND CHARACTERISTIC SPECIES, (IN FRENCH),
Lab. Hydrobiol., ORSTOM, N'Djamena, Chad.
A. Iltis.
Cah O R S T O M Ser Hydrobiol. 8(2), p 81-92, 1974.

Descriptors: Algae, Biotope, *Chad, *Classification, Environments, Kanem, *Lakes, *Phytoplankton, Pond, Species, *Alkaline water.

The rank correlation of Kendall, correlations of Bravais-Pearson and the definition of characteristic species by the method of the 'ecart reduit' permit the classification of the permanent lakes studied in 3 great biological zones. Temporary ponds, where the variations in salinity are continuous and important, compose particular biotopes, however, their algal flora has affinities with that of polycarbonated lakes. (See also W76-09596; W75-09020; and W75-06778)--Copyright 1975, Biological Abstracts, Inc.
W79-00893

IRON-ALGAE INTERACTIONS AS A FACTOR IN LAKE ERIE WATER QUALITY,
State Univ. of New York at Fredonia. Environmental Resources Center.
For primary bibliographic entry see Field 5C.
W79-00936

THE FRESH-WATER POLYCHAETE, MANAYUNKIA SPECIOSA, IN A THERMAL CHANNEL, CLEVELAND HARBOR LAKE ERIE.
Cleveland State Univ., OH. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W79-00985

IN SITU EXPERIMENTS ON THE DISSOLVED AND COLLOIDAL STATE OF IRON IN AN ACID BOG LAKE,
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 5C.
W79-00990

2I. Water In Plants

DROUGHT INJURY AND IRRIGATION EFFECT ON THE GROWTH AND YIELD OF WARM SEASON GRASSES CULTIVATED ON MINERAL SOIL, (IN JAPANESE),
Tokai-Kinki Natl. Agric. Exp. Stn., Ishinden-Ogoso, Tsu, Mie, Jpn.
For primary bibliographic entry see Field 3F.
W79-00516

OXYGEN PRODUCTIVITY OF PERIPHYTON ON HIGHER AQUATIC PLANTS (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
V. V. Yurchenko.
Gidrobiol Zh 13(4), p 49-52, 1977.

Descriptors: Algae, Epiphytes, Minerals, Aquatic plants, *Periphyton, *Oxygen productivity(Plants), Oxygen requirements.

When estimating the effect of higher water plants on the O2 regime of a water body they should be considered as a complex with periphyton which depending on conditions, may increase or decrease O2 in the water. At low transparency, when periphyton contains a lot of mineral particles and vacant cells of algae, it may absorb isolated by water plant. With high transparency and abundant epiphyte development, O2 isolated by algae is added to O2 produced by higher water plants.--Copyright 1978, Biological Abstracts, Inc.
W79-00529

PRELIMINARY GUIDE TO WETLANDS OF THE GULF COASTAL PLAIN, MAJOR ASSOCIATIONS AND COMMUNITIES IDENTIFIED.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A055 705, Price codes: A05 in paper copy, A01 in microfiche. Technical Report Y-78-5, May 1978. 103 p, 10 fig, 82 ref, 3 app.

Descriptors: *Gulf Coastal Plain, *Plant populations, *Wetlands, *Marshes, *Marsh plants.

This guide to the major plant associations and communities found in wetlands within the Gulf Coastal Plain is one of a series of eight such guides, each prepared by a specialist or specialists familiar with the wetlands in the region covered by the guide. The guides are intended for distribution to the various U.S. Army Engineer Districts for use in wetland identification in the implementation of Section 404 of the Federal Water Pollution Control Act Amendments of 1972. The classification system in the guide is intended solely for use in the Section 404 permit program and is not considered a classification system for other purposes. (WES)
W79-00536

COLONIAL BIRD USE AND PLANT SUCCESSION ON DREDGED MATERIAL ISLANDS IN FLORIDA; VOL. II: PATTERNS OF PLANT SUCCESSION,
Seabird Research Inc., Culver City, CA.
For primary bibliographic entry see Field 6G.
W79-00544

UNDERGROUND BIOMASS DYNAMICS AND SUBSTRATE SELECTIVE PROPERTIES OF ATLANTIC COASTAL SALT MARSH PLANTS,
Georgia Univ., Sapelo Island. Marine Inst.
J. L. Gallagher, F. G. Plumley, and P. L. Wolf.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A055 761, Price codes: A08 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-77-28, December 1977. 167 p, 39 tab, 15 fig, 25 ref, 3 append.

Descriptors: *Biomass, *Marsh plants, *Salt marshes, *Atlantic coastal plains, *Dredged material, *Substrates, Coastal plains, Plant populations.

Provides information applicable to marsh development on dredged material, particularly methodologies that can be used for determining which marsh plants will be likely to do well on various kinds of dredged material and when a marsh, which has been established on dredged material, approaches natural conditions. Focuses on three major efforts: an investigation of underground biomass dynamics, characterization of soils supporting the salt marsh plants, and experimentation on the substrate selective properties of several of the marsh plants studied. The methods and results for the specific aspects of these three efforts are delineated in five self-contained sections of the report: underground biomass profiles and dynamics in Atlantic coastal marshes, comparison of some tidal marsh soils along the Atlantic Coast, response of salt marsh plant stands to a pulse of ammonium nitrate, salt marsh plant growth on three types of dredged material, and a bioassay approach to studying marsh plant root growth in natural soil and dredged material. Findings indicate that in developing salt marsh on dredged material, five substrate problems should be considered: stability, pH characteristics; salinity characteristics; soil characteristics; and nutrients, of which nitrogen appears to be the key element. (WES)
W79-00545

PRELIMINARY GUIDE TO WETLANDS OF PENINSULAR FLORIDA; MAJOR ASSOCIATIONS AND COMMUNITIES IDENTIFIED.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A054 191, Price codes: A05 in paper copy, A01 in microfiche. Technical Report Y-78-2, February 1978. 92 p, 12 fig, 75 ref, 3 append.

Descriptors: *Plant populations, *Wetlands, *Florida, *Classification.

This guide to the major plant associations and communities found in wetlands within peninsular Florida is one of a series of eight such guides, each prepared by a specialist or specialists familiar with the wetlands in the region covered by the guide. The guides are intended for distribution to the various U.S. Army Engineer Districts for use in wetland identification in the implementation of Section 404 of the Federal Water Pollution Control Act Amendments of 1972. The classification system in the guide is intended solely for use in the Section 404 permit program and is not considered a classification system for other purposes. (WES)
W79-00547

CHANGES IN THE CHARACTER OF MEADOW PLANT COMMUNITIES INDUCED BY THE OVERFLOW AND STAGNATION OF SALT WATER, (IN POLISH),
Polish Academy of Sciences, Krawkow. Inst. Uprawy Roli Roslin.
For primary bibliographic entry see Field 5B.
W79-00610

THE CONCEPT OF FLOODING OF BOTANICAL OBJECTS AND CLASSIFICATION OF FLOODING, (IN UKRANIAN),
Akademiya Nauk URSR, Kiev. Central Republican Botanical Garden.
I. O. Davydenko.
Ukr Bot Zh 33(1), p 89-90, 1976.

Descriptors: *Plant physiology, *Flooding, Underflooding, *Classification(Botanical), Groundwater level, Soil-water-plant relationships.

Underflooding is defined as flooding caused by the rise in groundwater level due to the raising of capillary fringe or partial drowning of a plant in the substrate. The effects of the underflooding on the plant are classified as stimulating, indifferent, depressant or lethal. The causes of underflooding are listed as anthropogenic, natural or combined.--Copyright 1978, Biological Abstracts, Inc.
W79-00612

PRELIMINARY GUIDE TO WETLANDS OF PUERTO RICO, MAJOR ASSOCIATIONS AND COMMUNITIES IDENTIFIED.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
Technical Report Y-78-3, April 1978. 77 p, 3 fig, 47 ref, 3 append.

Descriptors: *Wetlands, *Plant populations, *Puerto Rico.

One of a series of eight preliminary guides to the dominant plant associations and communities found in the major wetlands of the United States. The primary purpose is to aid regulatory functions personnel in recognizing and delineating wetlands subject to permit regulation under Section 404 of Public Law 92-500 (Federal Water Pollution Control Act Amendments of 1972). Consists of three parts. An introduction covers the purpose and use of the guidebook as well as general information about Section 404 wetlands. The second part, 'Wetlands of Puerto Rico,' consists of three major sections: Regional Environment, Regional Botanical References, and Wetland Types. The section on regional environment provides a broad context for the more detailed descriptions of the dominant plant associations and communities found in the major wetlands of the region. The nomenclature standard used for the guide is presented in the section on regional botanical references. Description of wetland vegetation is based upon data from the literature and scientists familiar with the region. This section provides a description sufficiently detailed for field use but does not report minor variations of each wetland. The third part contains references to pertinent publications and is specific to the region.
W79-00758

DATA TOWARD THE UNDERSTANDING OF THE HYDROBIOLOGICAL STATUS OF DEAD TRIBUTARY OF THE BODROG NEAR SAROSPATAK: III. FLORA AND FAUNA, (IN GERMAN),
Lajos Kossuth Univ., Debrecen (Hungary). Zoological Inst.

G. Devai , I. Bansci, I. Devai, K. Horvath, and A. Szabo.
Acta Biol Debrecina. 10/11, p 117-128, 1972.

Descriptors: Algae, Bodrog, Ciliata, Cladocera, Copepods, Dead tributaries, *Hungary, *Hydrobiological studies, Mollusca, Odonata, Rotatoria, Sarospatak, Tributaries, *Aquatic plant, *Aquatic animal, *Oxygen-carbon dioxide budget.

In 2 previous parts of this series, studies on the 2 budget of a backwater and some chemical properties of some waters near river Bodrog (between Sarospatak and Vegardo, NE Hungary) were published. A paper on the environmental conditions of this area was given by Gy. Devai. The present part contains lists of important plant and animal groups (algae flowering plants, Ciliata, Rotatoria, Cladoera, Copepoda, Mollusca and Odonata) partly in order to prepare the 4th part of this series which is going to present a general hydrobiological description of the area.--Copyright 1975, Biological Abstracts, Inc.
W79-00804

HABITAT STRUCTURE AND STREAM FISH COMMUNITIES,
Purdue Univ., Lafayette, IN. Dept. of Biological Sciences.
O. T. Gorman, and J. R. Karr.
Ecology, Vol. 59, No. 3, p 507-515, 1978. 4 fig, 3 tab, 40 ref.

Descriptors: *Habitats, *Aquatic habitats, *Stream beds, *Streamflow, *Niches, Seasonal, Fish populations, Biological communities, Ecology, Adaptation, Streams, Currents(Water), Channels, Channel improvement, *Indiana, Evolution, *Panama, *Species diversity.

Stream habitat complexity is correlated with fish species diversity in selected Indiana and Panama streams. Habitat diversity was measured along 3 dimensions judged important to a wide range of fish groups and applicable to many stream conditions: stream depth, bottom type, and current. Increasing community and habitat diversity followed stream-order gradients. Natural streams supported fish communities of high species diversity which were seasonally more stable than the lower-diversity communities of modified streams. After disturbances such as channelization, seasonal peaks in species diversity attain levels typical of undisturbed streams. Because seasonal changes in stream quality are high, the stability of the fish community is lower in modified than in natural streams. The general correlation between habitat characteristics and presence and absence of fish species suggests that most fishes of small streams are habitat specialists. (EIS-Deal)
W79-00940

THE SUBMERGED VEGETATION OF LAKE PONTCHARTRAIN, LOUISIANA,
Army Engineer District, New Orleans, LA.
For primary bibliographic entry see Field 2L.
W79-00988

2J. Erosion and Sedimentation

SOILS AS A FACTOR IN THE FORMATION OF WATER CHEMICAL COMPOSITION AND BENTHIC COMMUNITIES IN SMALL RIVERS OF THE DESNA BASIN, (IN RUSSIAN),
Inst. Hydrobiol., Acad. Sci. Ukr. SSR Kiev, USSR.
For primary bibliographic entry see Field 2K.
W79-00520

SESTON DYNAMICS AND TRIPTON SEDIMENTATION IN THE PELAGIC ZONE OF A SHALLOW EUTROPHIC LAKE,
Wisconsin Univ.-Madison. Lab. of Limnology.
For primary bibliographic entry see Field 5C.
W79-00567

EFFECTS OF PERMAFROST ON STREAM CHANNEL BEHAVIOR IN ARCTIC ALASKA,
Geological Survey, Laguna Niguel, CA. Water Resources Div.
For primary bibliographic entry see Field 2C.
W79-00623

NUMERICAL SIMULATION OF DISSOLVED SILICA IN THE SAN FRANCISCO BAY,
Geological Survey, Menlo Park, CA. Water Resources Div.; and National Oceanographic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorologica Labs.
For primary bibliographic entry see Field 2L.
W79-00635

MANUAL FOR METHODS OF QUICKLY VEGETATING SOILS OF LOW PRODUCTIVITY, CONSTRUCTION ACTIVITIES,
Midwest Research Inst. Kansas City, MO.
For primary bibliographic entry see Field 4D.
W79-00717

THE ADSORPTION-DESORPTION OF DIURON BY FRESHWATER SEDIMENTS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W79-00860

LABORATORY AND FIELD MEASUREMENTS OF UPWELLED RADIANCE AND REFLECTANCE SPECTRA OF SUSPENDED JAMES RIVER SEDIMENTS NEAR HOPEWELL, VIRGINIA,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5B.
W79-00881

NUMERICAL FLOW MODEL FOR AN ATLANTIC COAST BARRIER ISLAND TIDAL INLET,
North Carolina Univ. at Chapel Hill. Center for Marine and Coastal Studies.
For primary bibliographic entry see Field 2L.
W79-00932

CONTRIBUTION OF NUTRIENTS FROM SEDIMENTS AND INTERSTITIAL WATER TO COLVILLE RIVER SYSTEM, ALASKA,
Louisiana State Univ., Baton Rouge. Dept. of Marine Science.
For primary bibliographic entry see Field 2K.
W79-00989

IN SITU EXPERIMENTS ON THE DISSOLVED AND COLLOIDAL STATE OF IRON IN AN ACID BOG LAKE,
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 5C.
W79-00990

THE SHOALING OF BREAKWATER HARBOR, CAPE HENLOPEN AREA, DELAWARE BAY, 1842 TO 1971,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 2L.
W79-00996

WORKSHOP IN INSTRUMENTATION FOR NEARSHORE PROCESSES. JUNE 16-17, 1977, LA JOLLA, CALIFORNIA,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 2L.
W79-00997

2K. Chemical Processes

COLORIMETRIC ANALYSIS OF AMMONIA IN WATER,
American Univ., Washington, DC. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W79-00503

SOILS AS A FACTOR IN THE FORMATION OF WATER CHEMICAL COMPOSITION AND BENTHIC COMMUNITIES IN SMALL RIVERS OF THE DESNA BASIN, (IN RUSSIAN),
Inst. Hydrobiol., Acad. Sci. Ukr. SSR Kiev, USSR.
I. K. Palamarchuk, A. D. Konenko, V. M. Sidorendo, and V. V. Polishchuk.
Gidrobiol Zh 12(4), p 34-42, 1976.

Descriptors: Basins, *Benthic communities, Biomass, *Chemical composition, Flow, Invertebrates, Nutrients, Rivers, Soils, Species, Streams, USSR, *Water pollution, *Bottom sediments, *Desna watershed(USSR).

The soils of watershed area and bottom sediments of small rivers, especially at the periods of minimal streamflow, have an essential effect on the formation of the water's chemical composition, thus determining to a considerable extent the pH values, content of HCO3-, Ca2, Mg2+, NH42- and phosphate ions. Biomass and species composition of the invertebrate benthic organisms depend on the content in the soils of Ca, organic matter and its nutrients.--Copyright 1977, Biological Abstracts, Inc.
W79-00520

EFFECT OF MACROPHYTES ON SOME HYDROCHEMICAL INDICES OF SHALLOW AREAS OF THE KREMENCHUG RESERVOIR (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
For primary bibliographic entry see Field 5A.
W79-00606

THE QUALITY ASSURANCE PROGRAM OF A NATIONAL LABORATORIES SYSTEM,
Geological Survey, Albany, NY. Water Resources Div; and Geological Survey, Reston, VA. Water Resources Div; and Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 5A.
W79-00621

GLOBAL DISTRIBUTION OF CARBON DIOXIDE DISCHARGERS, AND MAJOR ZONES OF SEISMICITY,
Geological Survey, Reston, VA. Water Resources Div.; and Geological Survey, Reston, VA. Geologic Div.; and Geological Survey, El Paso, TX. Water Resources Div.
I. Barnes, W. P. Irwin, and D. E. White.
Geological Survey Water-Resources Investigations 78-39 (open-file report), May 1978. 12 p, 1 plate, 160 ref.

Descriptors: *Earthquakes, *Seismology, *Carbon dioxide, *Volcanoes, Gases, Craters, Geothermal studies, Metamorphic rocks, Geochemistry, Evaluation.

Carbon dioxide discharges of the circum-Pacific belt are in a seismically active zone and in part stem from contact metamorphism. Carbon dioxide discharges in Europe and Asia Minor, also in an area of high seismic activity, are in part from regional metamorphism and are in areas of very high heat flow. (Woodard-USGS)
W79-00637

MAGNETIC RELAXATION STUDY OF WATER MOBILITY IN CLAY MINERALS,
North Dakota Univ., Grand Fork.
For primary bibliographic entry see Field 2G.
W79-00679

DENSITY MAXIMA IN HIGH-PRESSURE SUPERCOOLED WATER AND LIQUID SILICON DIXOIDE,
Purdue Univ., Lafayette, IN. Dept. of Chemistry.
For primary bibliographic entry see Field 1A.
W79-00864

ISOTHERMAL COMPRESSIBILITY OF SUPERCOOLED WATER AND EVIDENCE FOR A THERMODYNAMIC SINGULARITY AT -45 DEGREES C,
Purdue Univ., Lafayette, IN. Dept. of Chemistry.
For primary bibliographic entry see Field 1A.
W79-00866

FIELD CHAMBER MEASUREMENTS OF CO2 FLUX FROM SOIL SURFACE,
Kansas State Univ., Manhattan. Evapotranspiration Lab.
E. T. Kanemasu, W. L. Powers, and J. W. Sij.
Vol. 118, No. 4, p 233-237, 1974. 2 fig, 19 ref. OWRT A-044-KAN(5), 14-31-0001-3516.

Descriptors: Diffusion, *Carbon dioxide, Chemical analysis, *Soil respiration, Mass flow.

Rates of carbon dioxide exchange were determined using an infrared gas analyzer in an open-chamber system in a field. During 1971 a fan was used to draw air through the chamber; the measured CO2 flux was approximately 40 percent greater than the highest rate reported in the literature. In 1972 two chambers were used: one under slight suction and the other under a slight pressure (compared with atmospheric pressure). The CO2 flux from the soil surface inside the 'pressure' chamber was nearly an order of magnitude lower than inside the 'suction' chamber. Dispersion equations were used to separate mass flow and diffusion components of the total flux. Simplified analysis showed that mass flow could account for the large CO2 flux with slight negative pressures inside the chamber.
W79-00871

NMR INVESTIGATION OF MOBILITY OF WATER SORBED BY CLAY MINERALS,
North Dakota Univ., Grand Forks.
L. J. Laughlin.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 469, Price codes: A03 in paper copy, A01 in microfiche. MS Thesis, May 1977. 38 p, 10 fig, 17 ref, append. OWRT A-051-NDAK(2), 14-34-0001-7072.

Descriptors: Soil moisture, Adsorbed water soil, Physical properties, *Nuclear magnetic resonance, *Clays, Mineralogy, Calcium, Sodium, Soil water movement, *Montomorillonite, Soil analysis.

The mobility of water sorbed in different clay minerals was studied using NMR relaxation times and using diffusion coefficients as measured by pulsed field gradient and radiotracer techniques. In general, T1 and T2 measurements showed an increase in mobility as a function of water content. However, T2 measurements for Ca-Montmorillonite leveled off at 60% water content and slightly decreased beyond 60% moisture level. Diffusion measurements using the pulse gradient method were not possible for the Montmorillonites because of the small values for the relaxation times. But, for Kaolin diffusion measurements were made, using the pulsed gradient technique, at 22 degrees C for all moisture levels and from 0 degrees C to 50 degrees C for 60% water content. The plot of ln D versus 1/T yields a straight line with an activation energy of 1.08 kcal/mole calculated from the slope. For the most part, the radiotracer results were smaller than those obtained by the pulsed gradient method. Noting that the time for diffusion with the pulsed gradient method is 7 msec, while the time for the radiotracer method was several hours, this difference is evidence of restricted self-diffusion for Kaolin. Since the pulse gradient system has a dead time of 4 msec, T2 must be about 6 msec or longer in order to measure the diffusion coefficient using this method.
W79-00910

CONTRIBUTION OF NUTRIENTS FROM SEDIMENTS AND INTERSTITIAL WATER TO COLVILLE RIVER SYSTEM, ALASKA,
Louisiana State Univ., Baton Rouge. Dept. of Marine Science.
C. L. Ho, and H. J. Walker.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A030 392, Price codes: A02 in paper copy, A01 in microfiche. Geografiska Annaler, Vol. 58, Ser. A1-2, p 41-54, 1976. 8 fig, 6 tab, 39 ref.

Descriptors: *Rivers, *Sediments, *Alaska, *Nutrients, Floods, Nitrogen, Phosphorus, Clays, Plankton, Colville River System.

In 1971 water samples and bottom sediments were taken prior to breakup, during breakup, and during summer for nutrient study. The organic content in the sediments was higher in the uper river channel than in the oceans, whereas interstitial nitrogen components showed the opposite trend. Through diffusion and animal activity, some of these components may enter the water column beneath the ice during winter. During the flood period in early spring, interstitial components in the basin sediments are also contributed to river water by leaching. Once flooding begins, river water moves under the sea ice as a wedge. It contains more nutrients than does the seawater beneath it. This floodwater, rich in inorganic nitrogen, provides a basic ingredient for phytoplankton production. During summer, depletion of nutrients prevails as a result of phytoplankton uptake and dilution.(Stihler-Mass)
W79-00989

2L. Estuaries

SURVEY, ECOLOGY, AND SYSTEMATICS OF THE UPPER POTOMAC ESTUARY BIOTA: AUFWUCHS MICROFAUNA, PHASE II,
Georgetown Univ., Washington, DC. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W79-00506

TECHNICAL STUDY ON THE ARTIFICIAL PRECOCIOUS BREEDING OF ABALONE, HALIOTIS DISCUS HANNAI INO, (IN KOREAN),
Tong-Young Fish. Tech. Jr. Coll., Tong-Young, S. Korea.
Y. Kim, and C. Cho.
Bull Korean Fish Soc 9(1), p 61-68, 1976.

Descriptors: *Abalone, *Spawning(Artificial), Environmental effects, *Chungmu Bay(Korea), *Water temperature, *Light, Bays, Asia, *Korea, *Spawning(Abalone).

Effects of changes in environmental parameters, Water temperature and light period, on the induction of spawning were studied. Subtidal specimens of H.d. hanni were collected irregularly 6 times from April-June 1975 in Chungmu Bay near Jukdo Island, the southern coast of Korea. Specimens (150) were reared in 4 aquarium tanks in the laboratory and in a creel submerged in the sea during April 14-June 23, 1975. All groups kept in the 4 tanks and 1 creel showed very high spawning rates (70-100%), compared to those in the natural environment at sea until just before the natural spawning time (0-50%, average 16.4%). The photoenvironment may stimulate secretion of some internal substances, which permits fertilization to induce spawning. For effective breeding, abalones should be reared under controlled conditions with light below 2000 lx even during daytime for more than 60 days before induced spawning.
W79-00515

SOME ASPECTS OF REDOX TRENDS IN THE BOTTOM MUDS OF A MESOTROPHIC BAYOU ESTUARY,
University of West Florida, Pensacola. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W79-00533

PRELIMINARY GUIDE TO WETLANDS OF THE GULF COASTAL PLAIN, MAJOR ASSOCIATIONS AND COMMUNITIES IDENTIFIED.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 2I.
W79-00536

AN OPEN-COAST MATHEMATICAL STORM SURGE MODEL WITH COASTAL FLOODING FOR LOUISIANA; REPORT 1, THEORY AND APPLICATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W79-00537

MINERAL CYCLING IN SALT MARSH-ESTUARINE ECOSYSTEMS; ECOSYSTEM STRUCTURE, FUNCTION, AND GENERAL COMPARTMENTAL MODEL DESCRIBING MINERAL CYCLES,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5C.
W79-00539

GEORGETOWN HARBOR, SOUTH CAROLINA; REPORT 1, HYDRAULIC SALINITY, AND SHOALING VERIFICATION; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W79-00540

IMPROVEMENTS FOR MURRELLS INLET SOUTH CAROLINA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W79-00546

PRELIMINARY GUIDE TO WETLANDS OF PENINSULAR FLORIDA; MAJOR ASSOCIATIONS AND COMMUNITIES IDENTIFIED.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 2I.
W79-00547

PREDICTION OF HEAVY METAL UPTAKE BY MARSH PLANTS BASED ON CHEMICAL EXTRACTION OF HEAVY METALS FROM DREDGED MATERIAL,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5B.
W79-00548

ZONATION OF MARINE GASTROPODS ON A ROCKY INTERTIDAL SHORE IN THE ADMIRALTY GULF, WESTERN AUSTRALIA, WITH EMPHASIS ON THE GENUS NERITA,
Western Australian Museum, Perth.
For primary bibliographic entry see Field 5C.
W79-00555

BIOLOGICAL INTERACTIONS AND THE REALIZED NICHE OF EUPLOTES VANNUS FROM THE SALT MARSH AUFWUCHS,
New York Inst. of Tech., Old Westbury. Dept. of Life Sciences.
For primary bibliographic entry see Field 5C.
W79-00557

LIMNOLOGICAL STUDY OF THE CHICA DE SAN PEDRO, LA POSADA AND LO MENDEZ LAGOONS: I. QUANTITATIVE AND QUALITATIVE ANALYSIS OF WINTER PLANKTON (IN SPANISH),
Concepcion Univ. (Chile). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W79-00558

STRUCTURAL CHARACTERISTICS OF A DIATOM COMMUNITY EPIPHYTIC ON RUPPIA MARITIMA,
Rutgers - The State Univ., New Brunswick, NJ. Dept. of Entomology and Economic Zoology.
For primary bibliographic entry see Field 5C.
W79-00561

SPECIES DENSITIES OF MACROBENTHOS ASSOCIATED WITH SEAGRASS: A FIELD EXPERIMENTAL STUDY OF PREDATION,
Smithsonian Institution, Fort Pierce, FL.
For primary bibliographic entry see Field 5C.
W79-00564

TRANSPORT LIMITED NUTRIENT UPTAKE RATES IN DITYLUM BRIGHTWELLII,
Johns Hopkins Univ., Baltimore, MD. Dept. of Geography and Environmental Engineering.
For primary bibliographic entry see Field 5C.
W79-00565

CHANGES IN CARBON AND NITROGEN CONTENT DURING DECOMPOSITION OF THREE MACROPHYTES IN FRESHWATER AND MARINE ENVIRONMENTS,
Oakland Univ., Rochester, MI. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W79-00571

LIMNOLOGICAL STUDY OF THE CHICA DE SAN PEDRO, LA POSADA AND LO MENDEZ LAGOONS: II. QUANTITATIVE ASPECTS OF WINTER PLANKTON AND ITS RELATION TO PHYSICAL AND CHEMICAL ASPECTS OF THE ENVIRONMENT (IN SPANISH),
Concepcion Univ. (Chile). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W79-00577

CADMIUM ACCUMULATION BY THE MARINE RED ALGA PORPHYRA UMBILICALIS,
Aberdeen Univ. (Scotland). Dept. of Biochemistry.
For primary bibliographic entry see Field 5C.
W79-00578

DIFFERENCES IN PRODUCTIVITIES BETWEEN THE GREAT AUSTRALIAN BIGHT AND THE GULF OF CARPENTARIA, AUSTRALIA, IN SUMMER,
Hokkaido Univ., Hakodate (Japan). Faculty of Fisheries.
For primary bibliographic entry see Field 5C.
W79-00579

PARTICULARATE ORGANIC MATTER IN SURFACE WATERS OFF SOUTHERN CALIFORNIA AND ITS RELATIONSHIP TO PHYTOPLANKTON,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 5C.
W79-00581

THE CONTINENTAL SHELF AND THE EXCLUSIVE ECONOMIC ZONE: THE PROBLEM OF DELIMITATION AT UNCLOS III,
University of Wales Inst. of Science and Technology, Cardiff. Centre for Marine Law and Policy.
For primary bibliographic entry see Field 6E.
W79-00594

FLORIDA COASTAL ZONE MANAGEMENT: AN ANALYSIS,
For primary bibliographic entry see Field 6E.
W79-00602

WATER RESOURCES OF NORTHEAST NORTH CAROLINA,
Geological Survey, Raleigh, NC. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00631

NUMERICAL SIMULATION OF DISSOLVED SILICA IN THE SAN FRANCISCO BAY,
Geological Survey, Menlo Park, CA. Water Resources Div.; and National Oceanographic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorologica Labs.
D. H. Peterson, J. F. Festa, and T. J. Conomos.
Estuarine and Coastal Marine Sciences, Vol 7, No 2, p 99-116, August 1978. 13 fig, 22 ref.

Descriptors: *Model studies, *Water circulation, *Estuaries, *Dissolved solids, *Silica, Streamflow, Discharge(Water), Tidal effects, Saline water-freshwater interfaces, Mixing, Numerical analysis, California, *San Francisco Bay estuary, *Dissolved silica.

A two-dimensional (vertical) steady-state numerical model that simulates water circulation and dissolved-silica distributions is applied to northern San Francisco Bay. The model (1) describes the strong influence of river inflow on estuarine circulation and, in turn, on the biologically modulated silica concentration, and (2) shows how rates of silica uptake relate to silica supply and mixing rates in modifying a conservative behavior. (Woodard-USGS)
W79-00635

HARBOR AND WATERFRONT DEVELOPMENT PLANNING,
Higher Education Center for Urban Studies, Bridgeport, CT.
H. C. Chung.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 685, Price codes: A08 in paper copy, A01 in microfiche. March 1977, 7 fig, 19 charts, 12 tab, 164 p, Report No. UO-LCCM-BRI-77-007. H-2196R.

Descriptors: *Marinas, *Shore protection, *Harbors, *Water pollution, *Water quality, *Planning, *Management, Biological oxygen demand, Docks, Land use, Recreation, Shellfish, Flood damage, Erosion, Sedimentation, Urban planning, *Bridgeport(CT), *Waterfront management, *Waterfront development, *Coastal area management, Urban decay, Waterborne commerce.

This report presents the policy recommendations for the development and management of the harbor and waterfront of the city of Bridgeport, CT. Three models are presented for developing this manageent system: (1) the Harbor and Waterfront Agency (HWA) will function as a coordinator of harbor and waterfront activities and consist of representatives from various public and private agencies; (2) the management function of harbor and waterfront development will be assumed by the Office of Development Administration (ODA); the HWA would be under the jurisdiction of the ODA ad would function primarily as an advisory committee; (3) an independent harbor and waterfront authority with its own staff and budget would be established to devote full time to the task. The report identifies the management functions of this system and analyszes the task for each function. First, the adoption of a participatory planning process called the communicative planning process to ensure adequate planning of harbor development is recommended. This process advocates the full and effective use of the communication media to ensure that the plan would be developed and implemeted in consultation with all those affected. Second, the goals and objectives of the plan should be clearly stated and the means for implementing these measures should be delineated. The goals listed are the improvement of economic productivity; the overall improvement of environmetal quality through conservation; and the improvement of the quality of life of low income groups in waterfront areas. Third, the goals are operationalized and translated into specific policy recommendations for various functional areas of waterfront such as shellfish preservation, enlargement of parks and marinas, flood and storm damage control, water quality and others. An inventory of existing resources and uses in investigated in depth to provide a sound basis for the adoption of these plans.
W79-00657

STATE OF NORTH CAROLINA COASTAL MANAGEMENT PROGRAM AND DRAFT ENVIRONMENTAL IMPACT STATEMENT.
National Oceanic and Atmospheric Administration, Washington, DC. Office of Coastal Zone Management.
For primary bibliographic entry see Field 6G.
W79-00658

CAPE COD WATER QUALITY MANAGEMENT PLAN.
Massachusetts Water Resources Commission, Westborough. Water Quality Section.
For primary bibliographic entry see Field 5G.
W79-00666

ON TIDAL PROPAGATION IN SHALLOW RIVERS,
British Columbia Univ., Vancouver. Inst. of Oceanography.
P. H. LeBlond.
Journal of Geophysical Research, Vol. 83, No. C9, p 4717-4721, September 20, 1978. 3 fig, 2 tab, 10 ref.

Descriptors: *Tides, *Rivers, *Estuaries, *Model studies, *St. Lawrence River, MAthematical models, Equations, Tides, Tidal waters, Water levels, Time lag, Shallow water, *Tidal propagation, *Fraser River, Shallow rivers, Phase lags.

A reexamination of the momentum balance in shallow rivers, with scaling appropriate to the Saint Lawrence and the Fraser, showed that frictional forces exceed accelerations over most of the tida cycle. Consequently, tidal propagation in shallow rivers was envisaged more properly as a diffusion than as wave propagation phenomenon. The long time lags associated with low waters, unexplainable in terms of a simple wave propagation model, were accounted for easily by an equally simple diffusive model. (Sims-ISWS)
W79-00701

ANALYSES OF AROMATIC HYDROCARBONS IN INTERTIDAL SEDIMENTS RESULTING FROM TWO SPILLS OF NO. 2 FUEL OIL IN BUZZARDS BAY, MASSACHUSETTS,
Woods Hole Oceanographic Institution, MA. Dept. of Biology; and Woods Hole Oceanographic Institution, MA. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W79-00719

HABITAT DEVELOPMENT FIELD INVESTIGATIONS, RENNIE ISLAND MARSH DEVELOPMENT SITE GRAYS HARBOR, WASHINGTON, SUMMARY REPORT,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
M. K. Vincent.
Technical Report D-78-11, April 1978. 94 p, 6 fig, 21 ref, 4 append.

Descriptors: *Habitats, *Marsh management, *Salt marshes, On-site investigations, *Grays Harbor(Wash), *Rennie Island(Wash), Washington.

A salt marsh development project originally planned for Rennie Island in Grays Harbor, Washington, was terminated after a detailed baseline analysis. These studies indicated that extremely high wave energy conditions at the site would make marsh development infeasible without a substantial protective and retaining structure. Foundation analyses indicated a weak, unstable condition that made a conventional rock or earthen dike unsuitable. An evaluation of various alternative structures revealed that no economically feasible options were available, so the marsh development project was terminated. (WES)
W79-00754

ZOOPLANKTON OF THE REGION OF NOSY-BE: V. CLADOCERA: CONTRIBUTION TO THE STUDY OF A TROPICAL EUTROPHIC BAY, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Nosy-Be (Madagascar). Centre Oceanographique (ORSTOM) de Nosy-Be.
For primary bibliographic entry see Field 5C.
W79-00809

ZOOPLANKTON OF THE NOSY-BE REGION: VII. SPATIAL-TEMPORAL DISTRIBUTION OF THE GENUS LUCIFER (DECAPODES SERGESTIDAE) IN THE PROVINCE NERITIQUE, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Nosy-Be (Madagascar). Centre Oceaographique (ORSTOM) de Nosy-Be.
D. Petit.
Cah O R S T O M Ser Oceanogr. 11(3), p 373-385, 1973.

Descriptors: Decapods, *Distribution, Drift, *Estuaries, Genus(Lucifer), Lucifer-chacei, Lucifer-hanseni, Lucifer-penicillifer, Lucifer-Typus, Malagasy-republic, Neritique, Nosy-Be, Plankton, Province, Rainy, Season, Sergestidae, *Spatial distribution, *Temporal distribution, Trophic levels, *Zooplankton.

Four species, L. typus, L. penicillifer, L. chacei and L. hanseni are collected seasonally in neritic waters. They are divided into 2 groups: L. typus, oceanic; and L. penicillifer, L. chacei and L. hansemi, in order of their increasing neritic habitat. L. penicillifer and L. chacei are found on the continental shelf during the rainy season; L. hanseni, inner neritic, is collected in the outer neritic area when the estuary waters drift. The station nearest the shore is the richest in neritic species. These are driven back on the coast in the dry season, when L. typus is found on the continental shelf. L. penicillifer shows a more definite seasonal cycle than L. chacei. Breeding is continuous at the inshore station. Trophic factors restrict abundance in the rainy season. (See also W77-02416) Copyright 1975, Biological Abstracts, Inc.
W79-00848

DOMES UPPER WATER PHYSICAL OCEANOGRAPHY, A COMPONENT OF THE DOMES PROGRAM,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W79-00885

DISTRIBUTION AND COMPOSITION OF THE SUSPENDED PARTICULATE MATTER IN THE WATERS OF THE DOMES REGION,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W79-00886

TRACE METAL BASELINES IN THE DOMES STUDY AREA,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W79-00887

THE MESA PUGET SOUND PROJECT, SEATTLE, WASHINGTON. FY76-ANNUAL REPORT.
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
MESA Annual Report for FY76, February 1978, 19 p, 1 fig, 9 ref.

Descriptors: *Baseline studies, *Water quality control, *Resources development, *Pollution abatement, Waste water, Washington, *Puget Sound Project(Wash), Annual report, Flushing time.

During FY76 and 76T (Fiscal Transitional Quarter-July through September 1976), the energy-related activities have constituted the major effort of the project. MESA (NOAA) funds have been used for water-quality studies of the central basin of Puget Sound, for purchase of oceanographic hardware and instrumentation, and for administration and scientific management of the petroleum and wastewater field efforts. Research tasks undertaken for the energy-related project were based upon: the need to obtain baseline data prior to potential increases in contaminant level; the complexity and time required by the study; funding limitations; and the timing requirements of resource managers. Therefore, during the first year, research resources were primarily expended upon baseline and transport studies. The wastewater studies focused on identification of the scope of potential wastewater problems in the central basin of Puget Sound. The major effort, an investigation into the flushing time of the central basin, indicated the possibility of surprisingly short flushing times, under certain oceanographic and atmospheric conditions, however the water quality surveys found that certain of the shallow southern basins were subject to poor water quality, probably due to dinoflagellate blooms. (NOAA)
W79-00888

MISSISSIPPI WETLANDS PROTECTION PRACTICE AND PROCEDURE.
Mississippi Univ. Law Center, University.
For primary bibliographic entry see Field 6E.
W79-00927

DISTRIBUTION AND ABUNDANCE OF BENTHIC MACROFAUNA IN THE SEWAGE SLUDGE DISPOSAL AREA, NEW YORK BIGHT APEX, FEBRUARY 1975,
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5B.
W79-00930

DISTRIBUTION AND ABUNDANCE OF BENTHIC ORGANISMS IN THE NEW YORK-NEW JERSEY OUTER CONTINENTAL SHELF,
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5B.
W79-00931

NUMERICAL FLOW MODEL FOR AN ATLANTIC COAST BARRIER ISLAND TIDAL INLET,
North Carolina Univ. at Chapel Hill. Center for Marine and Coastal Studies.
T. C. Gopalakrishnan, and J. L. Machemehl.
Sea Grant Publication No. UNC-SG-78-02, April 1978. 60 p, 17 fig, 3 tab, 8 ref, 5 append. Also as NC Center for Marine and Coastal Studies Publication No. 78-1. SG-04-6-158-44054.

Descriptors: *Barrier Islands, *Inlets(Waterways), *Flow measurement, *North Carolina, Tidal waters, *Mathematical models, Model studies, U.S. East Coast.

A numerical model for computation of flow in inlets with junction is developed. The Galerkin techinque is coupled with a finite element analysis in the flow model. The vertically integrated equations of momentum and mass conservation are used with appropriate boundary and initial conditions. The junction conditions are introduced by the time rates of charge of energy and mass flux at the junction. A 'double sweep' approach is used in solving for the dynamics of flow. A parabolic shape function is adopted in the model to satisfy the requirement of linear independence. The numerical flow model is verified with field data for Carolina Beach Inlet, North Carolina. The tidal fluctuations in the inlet gorge and tidal velocities in the Atlantic Intracoastal Waterway were used as initial and boundary conditions respectively. The tidal velocities in the inlet gorge and tidal fluctuations in the Atlantic Intracoastal Waterway were computed with the numerical simulation flow model and compared with field data. The Galerkin finite element flow model performed well considering the complex nature of flow in a tidal inlet. (NOAA)
W79-00932

TIDAL AFFECTED DISTRIBUTIONS OF SURFACE CHLOROPHYLL AND TRANSPARENCY IN THE NEW YORK BIGHT,
Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
For primary bibliographic entry see Field 5B.
W79-00933

FLOWS OF MATERIALS BETWEEN POORLY FLOODED TIDAL MARSHES AND ESTUARY,
Maryland Univ. Solomons, Chesapeake Biological Lab.
For primary bibliographic entry see Field 5C.
W79-00987

THE SUBMERGED VEGETATION OF LAKE PONTCHARTRAIN, LOUISIANA,
Army Engineer District, New Orleans, LA.
G. N. Montz.
Castanea, Vol. 43, No. 2, p 115-128, June, 1978. 6 fig, 1 tab, 9 ref.

Descriptors: *Submerged plants, *Louisiana, *Surveys, *Spillways, Aquatic plants, Rooted aquatic plants, Wetlands, Lakes, Discharge, Effects, *Lake Pontchartrain(LA).

The submerged vegetation was surveyed before and after the April 1973 opening of Bonnet Carre' Spillway. Abundant species were Vallisneria americana, ruppia maritima, and Najas guadalupensis. The study revealed approximately 2,000 acres of water-bottom covered with submenrged vegetation, the greatest potion o fwhich was recorded between Green point near Mandeville, and Big Point near Slidell, along the north-eastern shoreline of the lake. The release of fresh river water did not have observable effects on the submerged vegetation.(Stihler-Mass)
W79-00988

REPORT ON FY 1977 NUMERICAL MODELING IN PUGET SOUND,
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program.
For primary bibliographic entry see Field 5B.
W79-00992

A STUDY OF THE SOURCES, TRANSPORT, AND REACTIONS OF SUSPENDED PARTICLES IN WATERS OF THE NEW YORK BIGHT,
University of South Florida, St. Petersburg. Dept. of Marine Science.
For primary bibliographic entry see Field 5B.
W79-00993

THE SHOALING OF BREAKWATER HARBOR, CAPE HENLOPEN AREA, DELAWARE BAY, 1842 TO 1971,
Delaware Univ., Newark. Coll. of Marine Studies.
J. M. Demarest, II.
Sea Grant Report No. DEL-SG-1-78, 1978 181 p, 29 fig, 3 tab, 32 ref, 2 append.

Descriptors: *Delaware, *Shoals, *Sedimentation, Harbors, Cape Henlopen(Del), *Delaware Bay.

The sedimentary processes in the breadwater Harbor-Cape Henlopen area were investigated. Toward this end, Shoaling rates, Changes in the pattern of shoaling with time, and shoreline changes were determined through bathymetric comparison, using survey data starting with the 1842 U.S. coastal survey map. In addition, information about modern conditions and processes in the study area were obtained through the determination of sediment distributions within the harbor and on the tidal flat, and by measurement of currents in two locations in the harbor. From the data thus obtained, the sedimentary processes responsible for the filling of the harbor and the effects of man-made structures on normal marine processes can be better understood. Therefore, data is presented for prediction of the future of Breakwater Harbor from a geologic viewpoint and for planning of the future of the harbor from a political-economical viewpoint. (NOAA)
W79-00996

WORKSHOP IN INSTRUMENTATION FOR NEARSHORE PROCESSES. JUNE 16-17, 1977, LA JOLLA, CALIFORNIA,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
R. J. Seymour.
Sea Grant College Program Publication No. 62, IMR Reference No. 78-102, (1978). 197 p, numerous fig, tab, ref.

Descriptors: *Sediment transport, *Instrumentation, *Conferences, *Nearshore processes.

This compilation of workshop papers are grouped in order of their primary objectives. The objectives were to: (1) determine the present capabilities for measuring and recording nearshore parameters related to sediment transport; (2) determine the specific needs of the Nearshore Sediment Transport Study for instrumentation; and (3) discover areas requiring further development to meet the needs of the Nearshore Sediment Transport Study. (NOAA).
W79-00997

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME I.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W79-00998

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME II.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W79-00999

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

A PROCESS AND PILOT PLANT DESIGN STUDY OF THE ABSORPTION FREEZING VAPOR COMPRESSION PROCESS.
Concentration Specialists, Inc., Andover, MA.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 276, Price codes: A07 in paper copy, A01 in microfiche. Final Report, (OWRT/S-78/2), December 1977, 77 p, 30 fig, 9 tab, append. 14-34-0001-7530.

Descriptors: *Desalination apparatus, *Absorption Freezing Vapor Compression, *Desalination, *Waste water treatment, *Separation techniques, *Freezing, *Water purification, Pilot plants, Systems analysis, Technology, Engineering, Design, Heat pumps, Costs, Cost comparisons.

A design study of the Absorption Freezing Vapor Compression (AFVC) process for desalination and other concentration/separation treatments of waste water was conducted. The AFVC process overcomes one of the major problem areas in previous freezing processes by using a closed cycle refrigerant loop to power the absorption cycle, thus eliminating compressor problems caused by direct compression of refrigerants contaminated with sea water. The process maintains low energy requirements with absorption cycle powered by a heat pump. Power consumption of 42 and 38 kw-hr/1000 gal were calculated for 100,000 and 1 million gpd plants respectively. A 25,000 gpf pilot plant was designed which consists of three major process vessels: freezer/absorber; wash column/melter and generator; and equipment skids, one for refrigeration equipment and one for pumps, air removal equipment, and heat exchangers. Capital and operating costs were calculated for 100,000 gpd and 1 million gpd plants as well as for the pilot plant. The major advantages of the AFVC process are summarized: (1) low power consumption of freezing compared to heat processes, which is especially important in view of rising fuel costs; (2) less corrosion using epoxy coated mild steel and aluminum which are not completely suitable for evaporative process plants and are often replaced by more costly titanium in heat processes; (3) no pretreatment is needed to prevent scaling even with brackish water saturated with calcium sulfate. (Majtenyi-IPA)
W79-00507

IMPACT OF ENERGY DEVELOPMENT ON COLORADO RIVER WATER QUALITY,
Utah State Univ., Logan. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5G.
W79-00605

VAPOR COMPRESSION VERTICAL TUBE FOAM EVAPORATION,
California Univ., Berkeley. Seawater Conversion Lab.
H. H. Sephton.
Desalination, No. 23, p 299-310, 1977, 2 fig, 5 tab, 13 ref. (California Water Resources Center Project S-174).

Descriptors: *Evaporators, *Desalination apparatus, *Heat transfer, *Desalination, *Water reuse, *Economic feasibility.

Vertical tube foam evaporation (VTFE) has been shown to provide a 4- to 6-fold increase in the evaporation-side heat transfer coefficient, and evaporator performance enhancements ranging from 50 to 200 percent for downflow and upflow vertical tube evaporators using double-fluted aluminum-brass distillation tubes. This process relies upon the addition of 1 - 20 parts per million of a selected surfactant to the feed, and imposition of foamy two-phase vapor-liquid flow over the heat transfer surfaces. Recent data obtained with a new 5000 US gpd VTFE pilot plant operated by the vapor compression (VC) technique is reported, showing the promise of applying this technology to seawater conversion and water reuse, in comparison with a conventional VC-VTE operation. Test data include overall heat transfer coefficients obtained on several typical saline waters, showing that substantial capital cost and energy reductions are obtainable with VTFE. Capital costs are reduced as a consequence of the lower heat transfer surface area required by VTFE, and energy cost reductions follow from a reduction in the delta T and VC compression ratio provided by VTFE. (Snyder-Calif)
W79-00680

THE PROBLEM OF WATER,
Weizmann Inst. of Science, Rehovoth (Israel).
For primary bibliographic entry see Field 3B.
W79-00795

SUPPLYING THE ISLAND OF FUERTEVENTURA WITH SEA WATER (ABASTECIMIENTO A LA ISLA DE FUERTEVENTURA CON AGUAS PROCEDENTES DEL MAR),
Ministerio de Obras Publicas, Barcelona (Spain).
F. Troyano Lobaton, R. Abadal Torruella, E. Baeza Benito, and C. Castaneyra Medina.
Agua, No. 81, p 12-24, Nov.-Dec. 1973. 6 fig.

Descriptors: *Desalinization plants, *Water supply, *Water sources, Costs, Fuerteventura, Canary Islands, Spain.

Fuerteventura is the most arid of the Canary Islands and its economic development had been restrained by an extremely scarce water supply. Prior to 1977, water was provided from wells with high levels of salinity. Surface water resouces are too scarce to provide and adequate supply. The desalinization of sea water was the only alternative that could substantially increase the water supply. A desalinization plant was constructed and began to operatin in 1977, permitting the island to expand its tourist industry. High costs are the major problem with this method of water supply the financial responsibility for further expansion of the supply should rest upon the water users. (Russell-Arizona)
W79-00801

GEOTHERMAL ACTUATED METHOD OF PRODUCING FRESH WATER AND ELECTRIC POWER,
J. M. Edmondson, and M. H. Smoot.
U.S. Patent No. 4,091,623, 9 p, 4 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 970, No 5, p 1654, May 30, 1978.

Descriptors: *Patents, *Geothermal studies, *Potable water, Water treatment, Condensation, Equipment, Heat exchangers, Electric power production, California, Saline water, Salton Sea(CA).

The salt content of water in the Salton Sea has increased in recent years to a level that is highly detrimental to marine life. By use of the invention, the Salton Sea may be reclaimed as a desirable environment for marine life. The method may be carried out by sequentially withdrawing water from the Salton Sea, distilling a portion of the withdrawn water by utilizing heat from the nearby geothermal sources, returning fresh potable distilled water to the Salton Sea, saline water to the geothermal reservoir, and concurrently generating electric power as the operation is carried out. A bore hole is formed in the earth adjacent a natural body of saline water such as the Salton Sea. The bore hole has pressurized mineral-containing fluid discharging at a temperature of greater than 212 degrees F. A closed reservoir is provided to which saline water can flow, preferably by gravity. Pressurized fluid from the geothermal source has a sufficient heat content that it tends to flash into steam when discharged into the reservoir under reduced pressure. The partially condensed steam and condensate flows to a heat exchange where condensation of steam to water is completed. In another form of the invention steam discharging from the closed reservoir is used to transform a low boiling point liquid to pressurized vapor that is used to drive a gas turbine that is connected to an electric generator. (Sinha-OEIS)
W79-00826

THERMAL POWER STATION COMBINED WITH A PLANT FOR SEAWATER DESALINATION,
Brown, Boveri and Co. Ltd., Baden (Switzerland). (Assignee).
H. Pfenninger.
U.S. Patent No. 4,094,747, 5 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 971, No. 2, p 680, June 13, 1978.

Descriptors: *Patents, *Desalination, *Water purification, Sea water, Heat exchangers, Condensation, Distillation, Thermal power plants, Turbines, Steam turbines, Gas turbines.

The object of the invention is to utilize economically the exhaust heat of a gas turbine while retaining the good efficiency of the gas turbine, to which is connected a heat exchanger for supplying heat to a seawater desalination plant. This object is achieved in that the heat exchanger is in the form of a waste heat boiler with, on the water side, two separate sections of which that section utilizing the high exhaust gas temperatures is used to generate steam for a steam turbine, and the second section constitutes directly or indirectly the heat source for the seawater desalination plant. An improvement in overall thermal efficiency is obtained by combining the gas turbine with a steam turbine. The exhaust gas outlet temperatures from the section of the boiler used to generate steam for the steam turbine are about 180-200C, which allows an optimum configuration for the entire steam section. The temperature difference between the two flow media in the steam-generating section of the boiler can then be chosen more favorably. The lower exhaust gas temperatures after the first boiler section are also very well suited to the second boiler section, which is used to generate high-temperature hot water for the desalination plant or to heat the seawater directly. (Sinha-OEIS)
W79-00846

A METHOD OF USING IRRIGATION DRAINAGE WATER FOR POWER PLANT COOLING,
California Univ., Berkeley. Sea Water Conversion Lab.
For primary bibliographic entry see Field 5D.
W79-00862

UNIVERSITY OF CALIFORNIA SALINE WATER CONVERSION RESEARCH.
California Univ., Berkeley. Sea Water Conversion Lab., and California Univ., Los Angeles. School of Engineering and Applied Science.
Progress Report, July 1, 1975-June 30, 1976. Water Resources Center Desalination Report No 63, 75 p.

Descriptors: *Desalination processes, *Saline water conversion, *Wastewater disposal, Ion exchange, Membrane processes, Electrodialysis, Reverse osmosis, Foam fractionation, Solar distillation, Geothermal distillation, Saline water, Wastewater treatment, Foamy-flow vertical tube evaporator, Scale control.

This report covers 1975-1976 fiscal year activities of the University's desalination program funded through the University of California Water Resources Center, and indicates related activities funded by other agencies. It is a compilation of synopses of ongoing research at two Californian universities, Berkeley and Los Angeles. Research topics at Berkeley include distillation studies using solar or geothermal energy, foam fractionation and flotation studies, membrane processes, ion exchange, and other subjects. Reported activities at Los Angeles are saline water demineralization by means of a semipermeable membrane, corrosion of metals and alloys in seawater, scale control studies and others. Each synopsis lists the study staff, briefly describes the up to date activities in each topic category, and lists study publications and other relevant references. Appendices list personnel, publications, reports, and theses. (Coan-NC)
W79-00875

PREPARATION OF ION-EXCHANGE MEMBRANES WITH EXTREMELY LOW AREAL RESISTANCES.
Southern Research Inst., Birmingham, AL.
Available from the National Technical Information Service, Springfield, VA. 22161 as PB-288 391, Price codes: A01 in paper copy, A01 in microfiche. Report OWRT/S--78/6, Final Report No. SoRI-EAS-78-303, June 6, 1978. 49 p, 1 fig, 11 tab, 14 ref. 14-34-0001-7518.

Descriptors: *Desalination, *Membrane processes, *Water purification, *Cation exchange, *Anion exchange, Separation techniques, Ion exchange, Saline water, Water quality control, Areal resistance, Polymers, Research and development, Saline water, Desalination apparatus, Water quality control.

Methods of preparing cation- and anion-exchange membranes with low areal resistances were developed for use in lower cost desalination of sea water. Membranes of both types were prepared having the desired resistance of 1 ohm-sq cm or less. Preparation involved using reinforcements to strengthen polymer compositions which had low resistances and acceptable selectivities, but which were weak and dimensionally unstable. The reinforcing materials were non-woven fabrics with high void volumes. In 1 N sodium chloride (NaCl) the best experimental cation-exchange membranes that could be made consistently had transference numbers of 0.76 to 0.79, compared to commercial membranes with a range of about 0.85 to 0.87. The best experimental anion-exchange membranes had transference numbers of 0.90, the same as commercially available membranes. It is recommended that further work is needed on cation-exchange membranes to improve transference numbers and prepare thinner (about 6-mil) membranes. With anion-exchange membranes already having acceptable transference numbers, it is recommended that thinner membranes should be prepared and evaluated at various temperatures. (Majtenyi-IPA)
W79-00904

RESEARCH ON IN SITU-FORMED CONDENSATION POLYMER FOR REVERSE OSMOSIS MEMBRANES,
Midwest Research Inst., Minnetonka, MN. North Star Div.
J. E. Cadotte, M. J. Steuck, and R. J. Petersen.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 387, Price codes: A05 in paper copy, A01 in microfiche. Final Report OWRT/S--78/8, March 1978. 47 p, 1 fig, 14 tab, 8 ref. 14-34-001-6521.

Descriptors: *Desalination, *Desalination processes, *Reverse osmosis, *Membrane processes, Water purification, Polymers, Polypiperazineamides, Crosslinking, Polysulfonesulfonic acids, Vinyl polymers, Acrylic polymers, Research and development, Saline water, Desalination apparatus, Polymerization, Chemical reactions, Water quality control.

Development of chlorine-resistant reverse osmosis membranes for use in desalinization of sea water was carried out using in situ formation of a thin, dense coating on a microporous support. Three types of polymer systems were studied: polypiperazineamide membranes formed by interfacial deposition, membranes formed by crosslinking, water-soluble polysulfone-sulfonic acids in situ, and linear vinyl or acrylic polymer membranes crosslinked in situ by chemical reactions or ultraviolet radiation. Most promising results were obtained with polypiperazineamide membranes which were prepared with fluxes of 20 to 28 gfd at a salt rejection of about 98%, tested at 1500 psig in 3.5% synthetic sea water. One variation of this method produced a membrane with salt rejection of 99.3%. A second variation still under investigation gives good chlorine resistance, extremely high flux, and good rejection of polyvalent ions but is not able to perform acceptably in rejecting monovalent ions. Polysulfone-sulfonic acid membranes were chlorine resistant but salt-rejections above 90% could not be obtained. Vinyl and acrylic polymers crosslinked on microporous polysulfone supports gave low fluxes in general unless severe crosslinking reactions were used and these often introduced chlroine sensitivity. (Majtenyi-IPA)
W79-00907

3B. Water Yield Improvement

THE PROBLEM OF WATER,
Weizmann Inst. of Science, Rehovoth (Israel).
Yosef Ben Mordechai.
Rehouot, Vol. 8, No. 1, Spring 1976, p 20-24.

Descriptors: *Water resources development, *Water policy, *Water management(Applied), Water distribution(Applied), Desalination, Hydrography mapping, Pollutants, Water reuse, Brackish waters, Forecasting, *Israel.

Because Israel is a semi-arid country, an intelligent water policy is a necessity for survival of the state. It is required that this policy be based upon an estimation of present and future needs, proper management and distribution systems, waste water usagy, desalination, and mapping of resoures. Accordingly, these problems are presently receiving priority sdtatus by the major research centers: The Weismann Institute, the Technion, the Hebrew university, and the Negev Research Institute. The Academic community is

attacking the probelm on two fronts: (1) mapping water supplies including the identification of the various polluting elements, and (2) developing techniques for either the reusage of wastewaters or for generating potable water from the sea or inland brackish sources. Moedern approaches ad techniques being investigated are reviewed here with emphasis placed upon the particular needs of this rapidly developing country. (Tckes-Arizona)
W79-00795

DESERTIFICATION AND TECHNOLOGICAL ADJUSTMENT IN THE MURRAY MALLEE OF SOUTH AUSTRALIA,
Oxford Univ. (England). School of Geography.
M. Williams.

Descriptors: *Deserts, *Australia, *Desertification, *Arid lands, Agricultural engineering, Environmental engineering, Manpower, Mechanical equipment, Transportation, Erosion control, Droughts, Biological components, Land tenure, Grazing, Economic justification, Economic feasibility, Range management, Grasses, Legumes, Land management, Land use, Social aspects, Social effects, Social participation.

Farming has been practiced in Murray mallee in southern Australia since before the beginning of this century. Although once productive and successful, economic decline, poor management and drought since 1930 have turned the 26,000 Km2 area into a badly eroded marginal area. Attempts at rejuvenation of this deteriorated region contatitute a broad-based attack including alteration of the structural framework of farming, improvement of the biological components and alteration of the mechanical and technological basis. Under the 'Marginal Lands Scheme' the director of agriculture has reduced the number of land holdings by half and reduced cropping to one year in three or four on any given piece of land with the fallow years being used for sheep grazing. The consequent increase in the average size of land holding has created more economically and environmentally viable working units. Biologically, new grass and leguminous pastures have replaced the previously widespread sowing of grains and have provided the needed diversification to stabilize the region. Mechanically, the adoption of tractors since the 1950's has increased the area per worker without reducing the total number of workers. As holdings have become larger and more fragmented the farmer and his family have been required to make the necessary social and economic adjustment. Further travel is necessary to reach both work and services, local services are more costly and sparse, population declines, and people move to the urban areas. Despite these adjustments, rainfall uncertainty and potential desertification remain as factors to be coped with. (Tickes-Arizona)
W79-00807

FEASIBILITY OF RAINWATER COLLECTION SYSTEMS IN CALIFORNIA,
California Univ., Berkeley. Sanitary Engineering Research Lab.
D. Jenkins, and F. Pearson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 378, Price codes: A04 in paper copy, A01 in microfiche. Technical Completion Report, Contribution No. 173, California Water Resources Center, August 1978, 55 p, 52 fig, 18 tab, 10 ref. (California Water Resources Center Project UCAL-WRC-W-539).

Descriptors: *Rain water, *Water sources, *Water supply, *Rain, Domestic water, Feasibility studies, *California, *Rainwater collection systems, Collection systems, Rainfall, *Alternative water use, Water treatment, Estimating.

The northern California drought of 1975-77 emphasized the need to explore alternatives for water supply. This research examined the feasibility of collecting rainwater for domestic consumption from roof areas into storage tanks. Rainfall records for 13 representative California locations were analyzed to provide a basis for estimating the supply of water from rainwater collection systems. Standard statistical measures of central tendency, distribution and variation, as well as serial correlation, were remarkably consistent. A single relationship emerged which expressed the yield of rainwater supply systems for all locations in terms of annual rainfall, collection area, and storage tank capacity for different levels of system reliability. Because of the high cost of the large storage tank needed for a completely reliable rainwater supply system to sustain even a minimal domestic demand, the most economical supply system will generally involve use of rainwater during the wet season, supplemented from other sources during dry periods. The concentration of lead in rainwater near urban areas frequently exceeds the recommended limit for drinking water, which would imply that rainwater supply systems are feasible only in rural areas. Microbiological contamination of rainwater results from bird droppings on the collection area, but chlorine disinfection proved effective. Turbidity can be removed to below the limit recommended for drinking water by a process of alum coagulation and settlement, feasible on a household scale. (Snyder-Calif, Davis)
W79-00855

WATER CONSERVATION INFORMATION DISSEMINATION DURING 1977 DROUGHT EMERGENCY,
Utah Center for Water Resources Research, Logan.
L. D. James, and W. H. Andrews.
Utah Water Research Laboratory, Water Resources Planning Series Report P-78-002, June 1978, 235 p, 27 tab, 3 append. OWRT T-0021 (7706)(1).

Descriptors: *Droughts, *Water conservation, Range management, *Water harvesting, Water reuse, Groundwater mining, Irrigation, Erosion, *Information exchange, *Information dissemination, Water distribution(Applied), Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.

As drought conditions in 1976 and 1977 became increasingly severe throughout the west and affected many other parts of the country, many states began special drought information dissemination efforts. This study was organized to provide a forum for the exchange of information among the respective states that could reduce duplication among independent efforts. The project collected information on: (A) Water-user conservation practices, (1) domestic use, (a) inside use, (b) outside use, (2) industrial, (3) commercial, and (4) irrigation; (B) Water-supplier management practices, (1) water conservation inducements, (2) emergency supply augmentation, (a) groundwater mining, (b) water harvesting, (c) water reuse, (3) reallocation among uses or users; (C) special drought problems, (1) livestock and range management, (2) effects on fish and wildlife, (3) fire danger, (4) effects on recreation, (5) energy effects (reduced generation and additional use), (6) effects of resulting changes in water quality including salinity, and (7) wind erosion. Types of information included (1) research results contributing to dealing more effectively with emergency drought situations, (2) research currently underway, (3) brochures or other material prepared for public distribution, (4) reports of extension agents or other technical personnel working with the public to solve drought problems, and (5) user or expert statements recommending supplementing or revising any of the above. This report contains 667 abstracts and a snythesis of the information obtained on each topic.
W79-01000

3C. Use Of Water Of Impaired Quality

ANTIVIRAL SUBSTANCES FROM CALIFORNIA MARINE ALGAE,
California Univ., Berkeley. Naval Biosciences Lab.
D. W. Ehresmann, E. F. Deig, M. T. Hatch, L. H. DiSalvo, and N. A. Vedros.
Journal of Phycology, Vol. 13, 1977, p 37-40. 2 tab, 14 ref. Sea Grant R/MP-12.

Descriptors: *Viruses, *Viricides, *Rhodphyta, *Algae, *Herpes simplex, *Coxsackie B5, Marine algae, Seaweeds, California, Coasts, Intertidal areas, Constantinea simplex, Polysaccharides, Farlowia mollis, Human diseases, Diseases, Public health.

Extracts of 28 species of intertidal marine macroscopic algae collected during low tide between 1971-75 in various northern California coastal habitats were examined for pharmacological activity against 12 mammalian viruses. The algae represented Chlorophyta, Phaeophyta, and Rhodophyta. Ten rhodophytes (red algae) contained substances which caused greater than a two-log reduction in infectivity of Herpres simplex virus types 1 and 2: Constantinea simplex, Cryptosiphonia woodii, Endocladia muricata, Farlowia mollis, F. crassa, F. compressa, Pikea pinnata, Leptocladia conferta, Cryptopleura violacea, and Nienburgia andersoniana. Constantinea simplex agent in extracts from C. simplex and Farlowia mollis was determined to be a structural polysaccharide on the basis of physical and chemical properties. Many of the active algae were members of the family Dumontiaceae (Cryptonemiales). Algal species which exhibited no antiviral activity by the methods used were: Ulva lactuca, Egregia menziesii, Cystoseira osmundacea, Fucus furcatus, Pelvetia fastigiata, Porphyra lanceolata, Calliarthron setchelliae, Corallina gracilis, Prionitis lanceolata, P. linearis, Agardhiella coulteri, Gigartinia canaliculata, Iridaea flaccida, I. heterocarpum, Halosaccion glandiforme, Rhodymenia lobulifera, Laurencia spectabilis, and Rhodomela larix. This study represents the first published survey of marine macroscopic algae for antiviral substances. (Lynch-Wisconsin)
W79-00590

SALINISATION IN THE SOUTHWEST OF WESTERN AUSTRALIA,
Western Australia Dept. of Conservation and Environment, Perth.
M. J. Mulcahy.
SEARCH, Vol 9, No 7 p 269-272, July 1978. 2 fig, 28 ref.

Descriptors: *Australia, *Laterites, *Salinization, *Vegetation effects, *Land management, Saline water, Saline soils, Pasture management, Environmental effects, Evaporation, Groundwater recharge, Water conservation, Water quality, Water pollution sources, Soil contamination, Drainage practices, Geomorphology.

Salinisation in the southwestern region of Western Australia is a problem caused largely by the replacement of indigenous deep-rooted vegetation with shallow-rooted crop ad pasture plants. The effect of clearing these areas for the sowing of selected agricultural crops has been a decrease in the amount of water lost by evapotranspiration ad the consequent increase in the volume of water available for groundwater recharge, discharge into streams, and for movement overland or at shallow depths beneath the soil surface. High soil and groundwater salt concentrations result. Variable landscape zonation in Western Australia is a cause for different levels of response or suseptibilities to these problems. Zones of dissected laterities, bauxitic laterities and lateritic sand plainsand salt

lakes are anayzed separately and an association is found between laterization of shield rock and degree of salinization present. With the exception of Kangaroo Island in southern Australia, salinisation does not apppear to be a major hazard on lateritic landscapes. (Tickes-Arizona).
W79-00803

MANAGEMENT OF BRACKISH WATERS IN ARID LAND AGRICULTURE: MODERN EXPERIENCES WITH ANCIENT PROBLEMS,
Ben Gurion Univ. of the Negev, Beersheba (Israel). Research and Development Authority.
M. Twersky.
Arid Lands Newsletter, No. 4, p 1-7, October 1976. 6 fig, 4 tab, 48 ref.

Descriptors: *Brackish water, *Arid lands, *Irrigation practices, Economic feasibility, Soil contamination, Water pollution sources, Soil-water-plant relationships, Water quality, Salinity, Flood irrigation, Trickle irrigation, Sprinkler irrigation, Management, Land management, Irrigation techniques, Israel.

The recent development of brackish water irrigation technologies are making it economically and physically possible to farm the arid and semi arid regions of the world. Proper use of brackish waters requires a thorough knowledge of soil and crop vulnerability to the various water and soil pollutants indigenous to the area of application. Accordingly, this author reviews the water quality and salinity criteria necessary to use marginal water supplies. A brief discussion of surface (flooding, furrow and sprinkler) sprinkler and trickle irrigation is presented with a discussion of the adaptive techniques and problems of each. Aiding the modern farmer in the utilization of these techniques is the development of management concepts and tools such as more accurate salinity measurement indicators, automatic irrigation control systems, high frequency irrigation techniques, means of optimizing chemical and fertilized application, and advances in the selection of varieties with higher genetic potential. (Tickes-Arizona)
W79-00810

WATERLOGGING AND SALINISATION IN IRRIGATED SEMI-ARID REGIONS OF NSW,
S. Pels.
SEARCH, Vol. 9, No. 7, p 273-276, July 1978. 2 fig.

Descriptors: *Saline water, *Drainage systems, *Australia, *Salinity, Brackish water, Saline water systems, Water pollution sources, Saline water intrusion, Seepage, Mixing, Chemical properties, Drainage practices, Tile drains, Tubewell drains, Salt water movement, Leaching, Water table, Waterlogging, Arid lands.

Irrigation, required in desert regions to practice agriculture, must be carefully managed to avoid salination and waterlogging and the consequent destruction of productive land. Salinisation and poor drainage are inherent problems in western New South Wales where subsoil and groundwater salinities are high. The addition of water through irrigation causes an imbalance in the hydrological equilibrium present in these desert areas and proper drainage schemes must be found to allow for leaching of imported salts and to reduce the occurrence of high water tables and waterlogging. Four case studies are presented: the Wakool irrigation district, the Curlwaa irrigation area, the Mildura Weir and the Reverine plains, to illustrate both causes and remedies for these problems. The use of tile and tubewell drainage techniques as well as the multiple use of irrigation and drainage waters are explained and illustrated. In areas where salt levels are particularly high, drainage waters must be conveyed to inland regions for evaporation. Problems such as these exist in many arid regions and semi arid regions throughout the world and through investigation followed by ameliorative measures are required to avoid widespread desertification and destruction of productive land. (Tickes-Arizona)
W79-00812

3D. Conservation In Domestic and Municipal Use

STATISTICAL AND STOCHASTIC ANALYSES OF SYNTHETICALLY GENERATED URBAN STORM DRAINAGE QUANTITY AND QUALITY DATA,
Purdue Univ., Lafayette, IN. Water Resources Research Center.
For primary bibliographic entry see Field 6A.
W79-00521

DEVELOPMENT OF COMPUTER PROGRAM FOR LINEARIZED SUBHYDROGRAPHS METHOD FOR URBAN RUNOFF DETERMINATION,
Akron Univ., OH. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W79-00526

ENVIRONMENTAL QUALITY EXPENDITURE PATTERNS AND URBAN LOCATION: EFFECTS ON INCOME GROUPS,
Ottawa Univ. (Ontario), Dept. of Geography and Regional Planning.
For primary bibliographic entry see Field 6G.
W79-00586

MANDATORY DEDICATION AND IMPACT FEES: A MEANS OF SHARING THE BURDEN OF GROWTH IN THE MELBOURNE-TILLMAN DRAINAGE DISTRICT,
For primary bibliographic entry see Field 6E.
W79-00601

COMBINED HOUSING AND STANDARD FOR WATER FLOW METERS,
For primary bibliographic entry see Field 7B.
W79-00827

WHAT CONSTITUTES 'BENEFITS' FOR URBAN DRAINAGE PROJECTS,
Shoemaker and Wham, Denver, CO.
For primary bibliographic entry see Field 6B.
W79-00872

VISUAL LAND USE COMPATIBILITY AS A SIGNIFICANT CONTRIBUTOR TO VISUAL RESOURCE QUALITY,
Massachusetts Univ., Amherst. Dept. of Landscape Architecture and Regional.
For primary bibliographic entry see Field 6B.
W79-00873

COMPUTER ANALYSIS OF THE WATER BUDGET OF THE PROPOSED OAK OPENINGS NEW TOWN, LUCAS COUNTY, OHIO,
Toledo Univ., OH.
For primary bibliographic entry see Field 4C.
W79-00902

PHYSICAL AND ECONOMIC ASPECTS ASSOCIATED WITH RUNOFF FROM URBAN GROWTH IN THE RALSTON CREEK WATERSHEDS,
Iowa Univ., Iowa City.
For primary bibliographic entry see Field 4C.
W79-00906

PRINCIPLES OF WATER RESOURCES PLANNING (PHASE II),
Rutgers - The State Univ., New Brunswick, NJ. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W79-00913

WORKING PAPER NOS. 7 - 10 OF THE EMERGENCY WATER ALLOCATION PROJECT, (7) IMPLEMENTATION OF A PREPAREDNESS PROGRAM; (8) ACHIEVING EQUITABLE AND EFFECTIVE WATER ALLOCATION; (9) RESTORATION OF A WATER DISTRIBUTION NETWORK; (10) IMPROVING EMERGENCY PREPAREDNESS,
California Univ., Irvine. School of Engineering; and California Univ., Irvine. Graduate School of Administration.
For primary bibliographic entry see Field 4A.
W79-00919

WORKING PAPER NO. 11 OF THE EMERGENCY WATER ALLOCATION PROJECT, MANUAL FOR WATER SERVICE EMERGENCIES FOR THE POWAY MUNICIPAL WATER DISTRICT,
California Univ., Irvine. School of Engineering; and California Univ., Irvine. Graduate School of Administration.
For primary bibliographic entry see Field 4A.
W79-00920

AN OUTLINE FOR THE STUDY OF EMERGENCY WATER ALLOCATION PROCEDURES,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00921

A CONCEPTUAL MODEL OF THE WATER DELIVERY SYSTEM IN THE SAN DIEGO AREA,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00922

THE CURRENT STATE OF EMERGENCY PLANNING FOR WATER SUPPLY IN THE SAN DIEGO AREA,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00923

EMERGENCY WATER ALLOCATION LITERATURE: SOURCES AND RETRIEVAL,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00924

EWAP DATA ACCESS SYSTEM - A MANUAL FOR THE USE OF THE EDGE PUNCH CARD FILE,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00925

THE TRENTON WATER CRISIS OF 1975: IMPRESSIONS AND ANALYSIS,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00926

3E. Conservation In Industry

ANALYSIS OF ECONOMIC EFFECTS OF ENVIRONMENTAL REGULATIONS ON THE INTEGRATED IRON AND STEEL INDUSTRY. VOLUME I.
Temple, Barker and Sloane, Inc., Wellesley Hills, MA.

For primary bibliographic entry see Field 5G.
W79-00788

GEOTHERMAL ACTUATED METHOD OF PRODUCING FRESH WATER AND ELECTRIC POWER,
For primary bibliographic entry see Field 3A.
W79-00826

CORROSION AND SCALE INHIBITORS FOR INDUSTRIAL RECIRCULATING COOLING WATER SYSTEMS,
American Cyanamid Co., Stamford, CT. (Assignee).
T. J. Suen, and A. J. Begala, Jr.
U.S. Patent No. 4,092,244, 6 p, 1 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 970, No 5, p 1856, May 30, 1978.

Descriptors: *Patents, *Industrial water, *Cooling wate, Recirculated water, Scaling, Corrosion, Chemical reactions, Water reuse, Recycling.

A chemical composition and a process for inhibiting corrosion and scaling on metal surfaces in industrial cooling water systems is disclosed. The process includes the addition to he cooling water of from 10 to 200 ppm of an alkyl polyethoxy compound having a free carboxylate, sulfonate or phosphonate group. In some preferred embodiments, 10 to 500 ppm of a mineral oil is added to the water system, in addition to the polyethoxy compound. (Sinha-OEIS)
W79-00832

PROCESS FOR RECOVERING CHEMICALS FROM THE WASTE LIQOURS OF SULFATE CELLULOSE DIGESTION AND THE WASTE WATERS OF BLEACHING,
Ahlstrom (A.) Osakeyhtio, Helsinki (Finland).
For primary bibliographic entry see Field 5D.
W79-00837

METHOD OF THE REMOVAL OF METALLIC MERCURY,
Tecneco, S.p.A., Fano (Italy). (Assignee).
For primary bibliographic entry see Field 5D.
W79-00840

A METHOD OF USING IRRIGATION DRAINAGE WATER FOR POWER PLANT COOLING,
California Univ., Berkeley. Sea Water Conversion Lab.
For primary bibliographic entry see Field 5D.
W79-00862

3F. Conservation In Agriculture

ESTABLISHING CROP ACREAGE FLEXIBILITY RESTRAINTS FOR SUBREGIONS OF THE TEXAS HIGH PLAINS,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 6D.
W79-00505

DROUGHT INJURY AND IRRIGATION EFFECT ON THE GROWTH AND YIELD OF WARM SEASON GRASSES CULTIVATED ON MINERAL SOIL, (IN JAPANESE),
Tokai-Kinki Natl. Agric. Exp. Stn., Ishinden-Ogoso, Tsu, Mie, Jpn.
K. Okamoto, S. Horiuchi, T. Ooba, and G. Nishimura.
Bull Tokai Kinki Natl Agric Exp Stn 29, p 1-39, 1976.

Descriptors: *Drought tolerance, Crop production, *Irrigation effects, African, Bahia, Bermuda, Buffel, *Grass, *Growth rates, height, Leaf, Millet, Panic, Plant physiology, Rhodes, Sorghum, Sudan, Tillers, Wilting, *Soils(Mineral).

Most of the species in the nonirrigated plot temporarily wilted; stem elongation and leaf expansion were retarded during the drought period, late July. The species recovered rapidly from drought injury after a rainfall. Yield increase by irrigation was generally high at the time of 1st cutting after irrigation (Aug.), but became lower at the 2nd and 3rd cutting after irrigation (Sept. and Oct.). Drought resistance was evaluated with decrease in yield, plant height and leaf area in bermuda grass, bahia grass, love grass (broad leaf type), rhodes grass, panic grass, barnyard grass, sorghum, African millet, buffel grass, sudan grass and blue panic (perennial). Drought resistance evaluated with the witling degree seemed to be high in bermuda grass, blue panic and buffel grass. For most grasses water content and stem ratio of irrigated forages were higher than those of non-irrigated ones. Irrigation accelerated the elongation of regrowing stems and the development of new tillers in the initial stage of regrowth, but generally had little influence on the total number of tillers in the final stage.--Copyright 1978, Biological Abstracts, Inc.
W79-00516

INFLUENCE OF WATER AND FERTILIZER MANAGEMENT ON YIELD AND WATER-INPUT EFFICIENCY OF CORN,
Florida Univ., Quincy.
For primary bibliographic entry see Field 5B.
W79-00530

SOIL WATER MOVEMENT AND UPTAKE BY PLANTS DURING WATER INFILTRATION AND REDISTRIBUTION,
Florida Univ., Gainesville. Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W79-00535

THE ECONOMIC REALITIES OF DROUGHT,
For primary bibliographic entry see Field 6B.
W79-00582

RECLAMATION ACT OF 1902: AFTER 75 YEARS, 160 ACRE LIMITATION HELD VALID,
For primary bibliographic entry see Field 6E.
W79-00604

DESERT TRANSFORMATION IN CHINA.
Academia Sinica, Taipei (Taiwan). Dept. of Desert Research.
For primary bibliographic entry see Field 4A.
W79-00798

THE ORGANIZATION AND EFFICIENT USE OF DESERT PASTURES IN THE USSR,
United Nations Educational, Scientific and Cultural Organization (USSR). Scientific Council on the Problems of Deserts.
V. N. Nikolaev.
Man and the Biosphere, USSR Academy of Sciences, p 1-17, Moscow, 1977.

Descriptors: *Pastures, *USSR, *Rotations, *Pasture management, Forages, Carrying capacity, Grazing, Arid lands, Land use, Deserts, Administrative organization, Land management techniques.

Although natural pastures in the desert regions of the U.S.S.R. are sparsely vegetated and excessively arid due to scarce rainfall confined to winter and autumn, they can be utilized as important sources of natural fodder for sheep and camels. Soviet scientists have worked out management plans designed to reduce the detrimental effects of natural and anthropogenic desertification in these areas. A brief history of the reclamation and use of pastures in the U.S.S.R is presented in two parts: use of pastures in the pre revolutionary period, and usage since the October socialist revolution. The former period was characterized by the nomadic herding of animals, managed only by the location of watering sites. In contrast, the second post revolution period has been dominated by planned and consistent reclamation efforts to restore the natural desert fodder. These reclamation and management techniques have been based upon more efficient interfarm organization and distribution of desert pastures and a series of rotational grazing schemes. These techniques and their successes are illustrated. (Tickes-Arizona)
W79-00802

DESERT DEVELOPMENT IN THE V. I. LENIN KARAKUM CANAL ZONE,
Desert Inst., Ashkhadad (USSR).
For primary bibliographic entry see Field 4A.
W79-00805

DESERTIFICATION AND TECHNOLOGICAL ADJUSTMENT IN THE MURRAY MALLEE OF SOUTH AUSTRALIA,
Oxford Univ. (England). School of Geography.
For primary bibliographic entry see Field 3B.
W79-00807

LAND TENURE AND DESERTIFICATION IN AUSTRALIA'S ARID LANDS,
For primary bibliographic entry see Field 6E.
W79-00811

DESERTIFICATION IN THE PASTORAL RANGELANDS OF THE GASCOYNE BASIN, WESTERN AUSTRALIA,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Resources Management, Canberra (Australia).
O. B. Williams.
SEARCH, Vol. 9, No. 7, p 257-261, July 1978. 4 fig, 1 ref.

Descriptors: *Range management, *Australia, Agro-meteorology, Vegetation effects, Environmental effects, Vegetation establishment, Erosion, Land reclamation, Monitoring, Grazing, Overgrazing, Pasture management, Carrying capacity, Livestock, Sheep, Biodegradation.

Annual rainfall for this area is about 200 mm. Vegetation is prodominantly an extensive high shrubland, with ground layer of either annual grasses, sparse perennial grasses or small chenopodiaceous shrubs. The basin is largely pastoral, little changed since its initial settlement a century ago. Recent investigations based on several parameters of degeneration, erosion, overgrazing, a takeover by undesirable vegetation, etc., resulted in recommendations for a reduction in numbers of sheep, withdrawal of seriously damaged rangeland from grazing, and restrictions on grazing some land classified as 'a risk.' Experience indicates that research should be concentrated on the regeneration of desired species on less degraded portions of the more productive rangelands. the authors point out that monitoring sites are on grossly degraded rangeland, a usual procedure in most countries and a singularly unproductive one for pastoralist and research workers. (Tickes-Arizona)
W79-00814

HARVEST DATES IN ANCIENT MESOPOTAMIA AS POSSIBLE INDICATORS OF CLIMATIC VARIATIONS,
Hebrew Univ., Jerusalem (Israel). Dept. of Atmospheric Sciences.
For primary bibliographic entry see Field 2B.
W79-00816

SPRINKLER IRRIGATION SYSTEM AND APPARATUS FOR DIRECTING A STREAM OF WATER INTO THE ATMOSPHERE,
Nelson Irrigation Corp., Walla Walla, WA. (Assignee).
B. R. Nelson.
U.S. Patent No. 4,091,996, 11 p, 8 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 970, No 5, p 1781, May 30, 1978.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, Irrigation systems, Irrigation effficiency, Flow control, Application equipment.

A method is described of directing a source of water under pressure, which may vary within a wide range of pressures above a predetermined minimum pressure, at a substantially constant rate of flow into the atmosphere for purposes of sprinkler irrigation. The water under pressure flows through the inlet to deform a resilient annular member an amount proportional to the amount such water pressure is in excess of the predetermined minimum pressure and by such deformation to reduce the size of the opening. A constant amount of water per unit time is contained in the stream through the sprinkler irrigation system. (Sinha-OEIS)
W79-00829

ROTARY SPRINKLER ARC ADJUSTMENT,
Telsco Industries, Inc., Dallas, TX. (Assignee).
H. C. Ridgway.
U.S. Patent No. 4,091,997, 7 p, 4 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 970, No 5, p 1781, May 30, 1978.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, Irrigation efficiency, Irrigation practices, Application equipment, Water delivery.

An arc adjustment easily and positively maintains the arc through which a rotary sprinkler operates. The system includes a rotatable nozzle supported from a shaft with the reversing mechanism attached to the nozzle and extending from the nozzle in the direction of the shaft. A notched ring or gear is attached to the shaft below the nozzle. A first wire locking collar has one end encircling the shaft above the notched ring and the opposite end formed in a loop extending radially from the shaft and terminating in a lateral end section for engagement with the notches of the ring. The locking collars are positioned so that the loops intercept the acutating arm of the reversing mechanism as the nozzle of the rotary sprinkler rotates on the shaft. The locking collars are positioned to any selected point. (Sinha-OEIS)
W79-00830

WATER DISPENSING APPARATUS,
A. K. Kock.
U.S. Patent No. 4,092,996, 11 p, 8 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 971, No 1, p 97, June 6, 1978.

Descriptors: *Patents, *Irrigation, *Irrigation systems, *Irrigation practices, *Irrigation efficiency, Application equipment, Water delivery, Pipes.

This invention is based on the concept of using two substantially identical, extendible and collapsible pipe-systems arranged to conduct water from a water source to one or more water sprays. Each system of pipes is constructed of a number of substantially rigid pipes and pipe-coupling devices which pivotally connect the pipes at the ends to permit water to flow from pipe to pipe through the coupling devices. The system of pipes is held together by holding means and is carried above the surface of the ground by supporting means. The pipe-systems can be provided with means for moving the systems automatically along a reciprocating path of pre-determined length. The speed at which the pipe-systems reciprocate and, also, the volume of water dispensed can be pre-set. (Sinha-OEIS)
W79-00834

IRRIGATION TOWER DRIVE,
G. C. Knutson.
U.S. Patent No. 4,093,036, 6 p, 8 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 971m No 1, p 110, June 6, 1978.

Descriptors: *Patents, *Irrigation, *Irrigation efficiency, Application equipment, Conveyance structures, Irrigation operation and maintenance, Irrigation towers, Drive mechanisms.

Irrigation towers utilized in irrigating cultivated land are usually provided with support and drive wheels capable of slowly advancing the tower over the land to be irrigated. Inasmuch as the tower wheels are driven very slowly various operating problems are encountered. The irrigation tower drive mechanism of this invention utilizes a sufficiently numerically high ratio drive train to reduce the tendency of the tower to overdrive the drive train when the tower is proceeding down an incline and a drive mechanism which is constructed in a manner tending to reduce surges in torque applied to the support and drive wheels of the tower. In addition, the drive system is constructed in a manner where the portions subject to malfunction are completely enclosed within a housng having wet sump lubrication. (Sinha-OEIS)
W79-00835

IRRIGATION PIPE LAYING AND PICK UP VEHICLE,
M. A. Goodsell.
U.S. Patent No. 4,093,082, 8 p, 7 fig, 17 ref; Official Gazette of the United States Patent Office, Vol 971, No 1, p 125, June 6, 1978.

Descriptors: *Patents, *Irrigation, *Irrigtion practices, *Irrigation efficiency, Irrigation operation and maintenance, Equipment, Pipes, Operations, Pipe laying equipment.

In order to make maximum use of irrigation piping it is moved from field to field as the need for irrigation changes. Therefore, it is desirable to have a vehicle specifically designed for picking up and laying irrigation pipe which reduces the manpower and equipment reqired to accomplish the task. This invention describes a self-propelled vehicle having a centrally mounted inclined guide trough for guiding pipe sections as the vehicle is driven along a row of attached pipe sections. The sections are guided upwardly to the level of a working platform. An angulation trough contacts the end of a pipe section an angulates a first pipe section relative to the next section so that the first section can be disconnected. Disconnected sections are placed in racks on either side of the platform. The two ends of the guide trough have different inclinations to aid in the assembly of the pipe sections when laying pipe. (Sinha-OEIS)
W79-00836

IRRIGATION APPARATUS,
O. DeRomano.
U.S. Patent No. 4,094,466, 3 p, 5 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 971, No 2, p 590, June 13, 1978.

Descriptors: *Patents, *Irrigation, *Subsurface irrigation, Irrigation systems, Irrigation efficiency, Application equipment, Diffusion.

A device for underground drainage and irrigation of soil includes a porous element which can be engaged about a distribution pipe at a perforation or opening in the pipe. Apertures in a pipe distribution system can be provided in two ways. In the first instance, a space may be provided between the ends of two separate, aligned pieces of pipe. The porous filter or diffusion member can be in the form of a flange connector joining the two adjacent pipe sections. Or the flow passages or apertures are formed by perforating a pipe at selected locations. The location and size of the perforations are selected according to the desired characteristics of the system. The apertures are selected according to the desired characteristics of the system. The apertures are then covered by a porous element permitting flow to be dispersed across the aperture and through the element. The individual porous elements are comprised of a quantity of small plastic particles, as for example, pellets of polyvinylchloride, sintered by application of heat, pressure or a bonding agent. The sintering leaves interstitial spaces to allow passage of fluid through the element. (Sinha-OEIS)
W79-00844

SPRINKLER HEAD SELECTIVELY OPERABLE IN A PART-CIRCLE MODE OR A FULL CIRCLE MODE,
Nelson Irrigation Corp., Walla Walla, WA. (Assignee).
L. P. Meyer.
U.S. Patent No. 4,094,467, 10 p, 5 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 971, No 2, p 590, June 13, 1978.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, Irrigation efficiency, Application equipment, Water delivery.

A sprinkler head having a reversing mechanism cooperable with spaced cam assemblies for effecting part circle mode operation in which the cam element of one of the cam assemblies is selectively movable by a spring pressed over center toggle linkage between two position, one of which causes the sprinkler head to operate in a part circle mode and other of which causes the sprinkler head to operate in a full circle mode. (Sinha-OEIS)
W79-00845

DECISION THEORY APPLICATIONS AND IRRIGATION OPTIMIZATION,
California Univ., Davis. Dept. of Civil Engineering.
M. J. English, and G. T. Orlob.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 436, Price codes: A04 in paper copy, A01 in microfiche. Contribution No. 174, Water Resource Center, Technical Completion Report September 1978, 48 p, 24 fig, 9 tab, 66 ref. (California Water Resources Center Project UCAL-WRC-W-538).

Descriptors: Irrigation, Economics, *Computer models, *Economic efficiency, *Irrigation efficiency, *Optimization, *Irrigation water use, *Water utilization, *Risks, Water supply, Decision making, Crop production.

This research concerns economic optimization of irrigation water use. Statistical decision theory is employed in the analysis, and particular attention is given to questions of uncertainty and utility. A general analytical model for dealing with the complex uncertainties in the relationship between irrigation water use and net farm income is developed. Non-linear utility functions are approximated by quadratic polynomials, leading to a simplified analysis of the decision problem in terms of mean and variance of net farm income. The analysis is extended to include portfolio combinations of two crops. The theoretical framework is applied to a case study involving farmers operating with a limited water supply. Optimal cropping patterns are selected for each of seven farmers. The cropping patterns considered include various combinations of two different crops and fallow land. Case study results indicate that a decision theoretic approach to irrigation optimization will lead to optimal irrigation strategies that may differ substantially from strategies selected without regard for uncertainty and utility. These optimal strategies will be more consistent with the preferences of the individual farmers. (Snyder-Calif, Davis)
W79-00857

ECONOMIC BENEFITS TO AGRICULTURE IN THE SAN JOAQUIN VALLEY DUE TO LONG-TERM PREDICTION STREAMFLOW FORECASTING,
California Univ., Los Angeles. Dept. of Engineering Systems.
M. J. Cohn.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 377, Price codes: A04 in paper copy, A01 in microfiche. Master of Science in Engineering Thesis, 1978. 50 p, 11 fig, 4 tab, 16 ref, 3 append. (California Water Resources Center Project UCAL-WRC-W-535).

Descriptors: Surface runoff, *Groundwater, *Costs, *Mathematical models, Groundwater recharge, California, Agriculture, Benefits, *Streamflow forecasting, *Economics, *San Joaquin Valley(Calif).

A mathematical model of a surface water and ground water system is developed to study agricultural benefits for various uncertainties of long-range streamflow forecasting. Both optimization and simulation techniques were used to solve the problem considering cost of water as a parameter. The model is specifically formulated to study San Joaquin Valley State Water Project Service Area agricultural benefits. Fifty years of historical data are routed through the State Water Project and Central Valley Project year 2000 level operation to obtain surface water deliveries. Three studies were evaluated: (1) sensitivity of benefits to increased or decreased historical flows, (2) effect of long-term (one year) streamflow prediction uncertainties on benefits and (3) effect of constant estimated streamflow on benefits. It is concluded that maximum benefits occur when maximum cotton acreage is planted every year. (Snyder-Calif, Davis)
W79-00861

NITROGEN FERTILIZER MANAGEMENT OF A LEMON ORCHARD AS RELATED TO NITRATE-POLLUTION POTENTIAL OF GROUND WATER,
California Univ., Riverside. Dept. of Soil Science and Agriculture Engineering.
For primary bibliographic entry see Field 5B.
W79-00899

ECONOMIC IMPACT OF FOSSIL ENERGY ALTERNATIVES ON CALIFORNIA IRRIGATED AGRICULTURE,
California Univ., Davis. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W79-00908

ECONOMIC IMPACT OF FLOODING ON AGRICULTURAL PRODUCTION IN NORTHEAST CENTRAL NORTH DAKOTA,
North Dakota State Univ., Fargo. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W79-00911

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

OPTIMIZATION OF REAL-TIME HOURLY OPERATIONS OF A COMPLEX, MULTIPLE PURPOSE RESERVOIR SYSTEM,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 6A.
W79-00501

A PROPOSED REVISION OF KENTUCKY'S WATER RIGHTS LEGISLATION,
Kentucky Water Resources Research Inst., Lexington.
For primary bibliographic entry see Field 6E.
W79-00524

AQUATIC FORAGE PROCESSING IN FLORIDA,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
L. O. Bagnall, T. W. Casselman, J. W. Kesterson, J. F. Easley, and R. E. Hellwig.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol. 20, No. 2, p 221-225, 1977. 4 fig, 4 tab, 21 ref. OWRT A-017-FLA(9), 14-31-0001-3809.

Descriptors: Drying, Chemical analysis, Nutrients, Digestion, *Aquatic weeds, *Water hyacinth, *Rooted aquatic plants, Animal physiology, Toxins, Feeds, *Florida, *Hydrilla.

The aquatic weeds, water hyacinth (Eichhornia crassipes) and hydrilla (Hydrilla verticillata), were chopped, mechanically dewatered, dehydrated and pelleted to determine whether they could be processed effectively and efficiently in existing processing systems and components. Pressing removed 60 to 80 percent of the water and 18 to 38 percent of the dry matter. The pressed products were difficult to dry rapidly and pellet. (Morgan-Florida)
W79-00531

BIOLOGICAL CONTROL OF AQUATIC WEEDS WITH PLANT PATHOGENS,
Florida Univ., Gainesville. Dept. of Plant Pathology.
T. E. Freeman.
Aquatic Botany, Vol. 3, p 175-184, 1977. 1 tab, 47 ref. OWRT A-033-FLA(3), 14-34-0001-7020.

Descriptors: *Biocontrol, Water weeds, *Plant pathogens, *Aquatic weed control.

Plant pathogens have characteristics that make them desirable candidates as biological control agents for aquatic weeds. They are: (1) numerous and diverse; (2) often host specific; (3) easily disseminated and self-maintaining; (4) capable of limiting populations without eliminating the species; and (5) non-pathogenic to animals. Recent investigations have revealed several pathogens with biocontrol potential. The algal viruses and the water hyacinth (Eichhornia crassipes (Mart.) (Solms-Laub.) pathogens, Acremonium zonatum (Sawada) Gams, Bipolaris stenospila (Drechs.) Shoemaker, Cercospora rodmanii Conway, Rhizoctonia spp and Uredo eichhorniae Fragoso and Ciferri have been studied the most extensively and appear to hold promise as biocontrol agents. (Morgan-Florida)
W79-00534

PRELIMINARY GUIDE TO WETLANDS OF PENINSULAR FLORIDA; MAJOR ASSOCIATIONS AND COMMUNITIES IDENTIFIED.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 2I.
W79-00547

ZOOPLANKTON STANDING CROPS IN THE DISCHARGE OF LAKE FRANCIS CASE, 1966-1972,
Fish and Wildlife Service, Yankton, SD.
For primary bibliographic entry see Field 5C.
W79-00551

TILAPIA--A MANAGEMENT TOOL FOR BIOLOGICAL CONTROL OF AQUATIC WEEDS AND INSECTS,
Caifornia Univ., Riverside. Div. of Biological Control.
For primary bibliographic entry see Field 5G.
W79-00592

MANDATORY DEDICATION AND IMPACT FEES: A MEANS OF SHARING THE BURDEN OF GROWTH IN THE MELBOURNE-TILLMAN DRAINAGE DISTRICT,
For primary bibliographic entry see Field 6E.
W79-00601

THE ICEBERG COMETH.: INTERNATIONAL LAW RELATING TO ANTARCTIC ICEBERG EXPLOITATION,
For primary bibliographic entry see Field 6E.
W79-00603

A EXPERIENCE IN DECIPHERING SPACE PHOTOGRAPHS AND TELEVISION IMAGES OF THE USTYURT PLATEAU FOR HYDROLOGICAL PURPOSES (IN RUSSIAN),
For primary bibliographic entry see Field 7B.
W79-00609

STATISTICAL SUMMARY OF STREAMFLOW DATA FOR KANSAS STREAMS IN THE ARKANSAS RIVER BASIN,
Geological Survey, Lawrence, KS. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00626

FLOODS IN KANSAS CITY, MISSOURI AND KANSAS, SEPTEMBER 12-13, 1977,
Geological Survey, Rolla, MO. Water Resources Div.; and Geological Survey, Topeka, KS. Water Resources Div.
L. D. Hauth, and W. J. Carswell, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A057 486, Price codes: A03 in paper copy, A01 in microfiche. Geological Survey Water-Resources Investigations 78-63, May 1978. 36 p, 16 fig, 2 tab, 4 ref.

Descriptors: *Floods, *Flood data, *Flood damage, *Peak discharge, *Flood profiles, Gaging stations, Streamflow, Rainfall-runoff relationships, Flood frequency, Hydrologic data, Hydrographs, Missouri, Kansas, *Kansas City area.

The storm of September 12-13, 1977, produced as much as 16 inches of rainfall in the Kansas City, Missouri-Kansas area, left 25 persons dead, many homeless, and over 50 million dollars in damages. Flood hydrographs taken from U.S. Geological Survey gaging-stations reflected two storms occurring within 24 hours. Measured precipitation indicated each storm event to be near a 100-year, 24-hour rainfall frequency. Peak discharges determined at selected locations in areas of greater rainfall depths exceeded those of the 100-year floods. (Woodard-USGS)
W79-00638

WATER RESOURCES DATA FOR HAWAII AND OTHER PACIFIC AREAS, WATER YEAR 1977--VOLUME 2. TRUST TERRITORY OF THE PACIFIC ISLANDS, GUAM, AMERICAN SAMOSA, AND NORTHERN MARIANA ISLANDS.
Geological Survey, Honolulu, HI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00640

WATER RESOURCES DATA FOR HAWAII AND OTHER PACIFIC AREAS, WATER YEAR 1977-hVOLUME 1. HAWAII.
Geological Survey, Honolulu, HI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00641

WATER RESOURCES DATA FOR MICHIGAN, WATER YEAR 1977.
Geological Survey, Lansing, MI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00642

WATER RESOURCES DATA FOR NORTH DAKOTA, WATER YEAR 1977.
Geological Survey, Bismarck, ND. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00643

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1977.
Geological Survey, Lincoln, NE. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00644

SEVERAL PROBLEMS OF THE RATIONAL CONSTRUCTION AND EXPLOITATION OF RESERVOIRS AND CANALS AS EXAMPLIFIED BY THE UCHINSKOYE RESERVOIR AND THE MOSCOW CANAL, (IN RUSSIAN),
All-Union Hydrobiological Society, Moscow (USSR).
For primary bibliographic entry see Field 5G.
W79-00655

HYDROLOGY, FULTON COUNTY, NEW YORK,
Fulton County Planning Dept. Johnstown, NY.
H. W. Fear.
August 1972, Series No. 0872-FCPD-FC-HY, 37 p, 20 fig, 10 tab. NYP-246.

Descriptors: *Hydrologic cycle, *Precipitation cycle, *Mean daily discharge, *Water supply, *Water resources, *Hydrology, Aquifer, Water table, Groundwater, Streamflow, Topography, Snowmelt, Droughts, Runoff, *Fulton County(NY), Isopleth, Wind.

The purpose of this report is to cover that portion of Fulton County's water resources related to precipitation and its resultant runoff. Records of precipitations at 14 sites and of temperatures at 5 sites in Fulton County and adjacent areas have been selected for this comprehensive hydrologic study. The 8-year period of record is 1965-1972, selected as being representative of general hydrologic conditions in Fulton County. Amounts of precipitation recorded at each of the 14 selected sites have been tabulated for each of the 8 years and are presented in tables. To illustrate the runoff from snowmelt and spring rains, hydrographs of mean daily discharges at selected points for the months of least average precipitation and months of highest average precipitation are included. Other information included in the report is the lowest and highest temperatures during each year, wind movement in Fulton County and a discussion of evaporation. A companion volume on snow resources has also been prepared. (Coan-NC)
W79-00663

STREAMS AND DRAINAGE BASINS, FULTON COUNTY, NEW YORK,
Fulton County Planning Dept. Johnstown, NY.
H. W. Fear.
December 1970, Series No. 1270-FCPD-FC-DB, 40 p. NYP-223.

Descriptors: *Drainage area, *Flood area, *Runoff, *Stream flow, *River basins, *Water resources, Floods, Recreation, Reservoirs, Streams, *Fulton County(NY), *Mohawk River(NY), *Sacandaga River(NY), Hudson River(NY), Hydraulic data, Water impoundment.

Surface waters of Fulton County find their way to two major tributaries of the Hudson River: streams in the northeastern part, draining nearly 34% of the county, are in the Sacandaga River Basin; those in the western section, draining 66% of the county, flow into the Mohawk River Basin. The purpose of this report is to present data on the delination and size of streams in Fulton County which are contributors to the flow of the Sacadaga River and Great Sacandaga Lake and to the flow of the Mohawk River. Information is presented on the physical characteristics of Fulton County. Delineation of watersheds of Fulton County streams in the Mohawk River Basin was made using 18 U.S. Geological Survey (USGS) topographic maps. Streamflow records of runoff are presented in tables. Delineation of the watersheds of the Sacandaga River was made using 11 USGS topographic maps. Flood problems are discussed; possible flood areas are noted on maps and data are provided on probable high-water elevations. Water impoundments areas are noted for potential municipal water supplies and flood control; dam heights at certain points are calculated and their resultant reservoir sizes are estimated.
W79-00664

FLOOD PLAIN INFORMATION: OGDEN RIVER, OGDEN, UTAH.
Army Engineer District, Sacramento, CA.
Prepared for Weber Area Council of Governments, UT, June 1971, 22 p, 6 fig, 7 plates, 5 tab.

Descriptors: *Utah, *Flood profiles, *Flood data, *Peak discharge, Floods, Historic floods, Standard Project Flood, Flood protection, Non-structural alternatives, Land use, Planning, Zoning, Control structures, Reservoirs, Flood plains, Flood flow, Ogden(UT), *Ogden River(UT), Weber County(UT), Intermediate Regional Flood.

The study area involves the Ogden River and its flood plain in Weber County, Utah, including the City of Ogden. Land uses occupying the flood plain include agriculture, commercial, manufacturing, and residential development, recreation facilities, and transportation and communication installations. Flood data were obtained from topographic maps, field studies, historical sources, and discontinuous stream gage records. Flooding results from high intensity convective-type cloudburst storms. Such storms occur from mid-April through September, but occur most frequently in July and August. Measures utilized to reduce flood damage potential in the study area include two reservoirs, channel maintenance, watershed management, and fire protection in the uncontrolled tributary area. The worst recorded flood occurred in April, 1936, discharging 3,700 cubic feet per second (cfs). At the upstream study limit, the Intermediate Regional Flood would discharge 2,200 cfs, while the Standard Project Flood would discharge 3,400 cfs. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W79-00669

FLOOD PLAIN INFORMATION: BOX ELDER CREEK, BRIGHAM CITY, UTAH.
Army Engineer District, Sacramento, CA.
Prepared for Utah Division of Water Resources, Box Elder County, and Brigham City, UT, June 1975, 41 p, 12 fig, 9 plates, 6 tab.

Descriptors: *Utah, *Flooding, *Flood profiles, *Flood data, *Peak discharge, *Flood protection, Floods, Historic floods, Flood peak, Flow characteristics, Flood plains, Standard Project Flood, Non-structural alternatives, Building codes, Land use, Planning, Zoning, Control structures, Levee, Floodwalls, Dams, Channel improvement, Brigham City(UT), *Box Elder Creek(UT), Intermediate Regional Flood.

The study area includes Box Elder Creek and its flood plain in the vicinity of Brigham City, Utah. Sixty percent of the flood plain is devoted to non-intensive land uses, and the remainder is developed with residential, commercial, industrial, and transportation uses. Flood data were obtained from topographic maps, field studies, historical sources, and discontinuous stream gage records. Cloudburst storms may cause flooding at any time, but they most commonly occur in July and August. Snowmelt flooding does not constitute a serious hazard. The flood of February 1911 is believed to be the area's worst flood event. No streamflow records are available. The maximum recorded peak flow of 290 cubic feet per second (cfs) occurred on April 18, 1962. At the downstream study limit, the Intermediate Regional Flood would discharge 1,100 cfs while the Standard Project Flood would discharge 2,900 cfs. Both floods would crest at approximately 4,220 feet mean sea level. There are no existing or authorized flood control structures that would reduce flood damage in the study area. Structural and non-structural flood control measures are described. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W79-00670

FLOOD PLAIN INFORMATION: WOLF CREEK, LAWTON, OKLAHOMA.
Army Engineer District, Tulsa, OK.
Prepared for City of Lawton, OK, June 1972, 34 p, 9 fig, 33 plates, 5 tab.

Descriptors: *Oklahoma, *Flooding, *Flood profiles, *Flood data, *Peak discharge, *Non-structural alternatives, Floods, Historic floods, Flood plains, Standard Project Flood, Flood protection, Flood plain zoning, Flood plain insurance, Warning systems, Building codes, Land use, Planning, Lawton(OK), *Wolf Creek(OK), Intermediate Regional Flood.

The study area involves Wolf Creek and its flood plain in the vicinity of Lawton, in Comanche County, Oklahoma. Land use in the flood plain is residential and commercial. Flood data were obtained from topographic maps, historical sources, and field studies. No stream gage records exist. Intense storms of short duration produce most floods during the spring and fall. Eight major floods have occurred since 1936 with the worst flood occurring in May 1957. On the main branch of Wolf Creek, the Intermediate Regional Flood (IRF) would discharge 20,500 cubic feet per second (cfs), and would rise 5.6 feet, while the Standard Project Flood (SPF) would discharge 32,600 cfs and would rise 7.1 feet. No structural flood control measures capable of affecting major floods are anticipated. Non-structural measures have been instituted by the city and the county. Guidelines for flood plain management are presented. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W79-00671

FLOOD PLAIN INFORMATION: CHIKASKIA RIVER, BLACKWELL, OKLAHOMA.
Army Engineer District, Tulsa, OK.
Prepared for City of Blackwell, OK, June 1976, 26 p, 7 fig, 11 plates, 5 tab.

Descriptors: *Oklahoma, *Flooding, *Flood profiles, *Flood data, *Peak discharge, *Non-structural alternatives, Floods, Historic floods, Flow characteristics, Flood plains, Flood protection, Flood plain zoning, Flood plain insurance, Building codes, Land use, Planning, *Chikaskia

River(OK), Blackwell(OK), 100-year flood, 500-year flood.

The study area includes 8.4 channel miles of the Chikaskia River and its flood plain in the vicinity of Blackwell, Oklahoma. Developments in the flood plain consist of residential land uses on the river's east side and agricultural land uses on the west. Flood data were obtained from topographic maps, field studies, historical sources, and stream gage records. Storms may cause flooding at any time of year, but they occur most frequently in the spring and summer months. The region's larger floods result from intense local thunderstorms. The worst recorded flood occurred in June 1923, discharging 100,000 cubic feet per second (cfs) and cresting 12 feet above flood stage. Other significant floods occurred in 1942 and 1973, discharging 85,000 cfs and 63,500 cfs, respectively. The 100-year flood would discharge 159,000 cfs and would crest 20.3 feet above flood stage, while the 500-year flood would discharge 268,000 cfs and would crest 24.1 feet above flood stage. Four of the area's five bridges would be obstructive to the 100-year flood. Although no structural flood control measures exist, the city of Blackwell has instituted non-structural measures. Guidelines for flood plain management are presented. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W79-00672

FLOOD PLAIN INFORMATION: PROVO RIVER AND ROCK CANYON CREEK, PROVO-OREM, UTAH.
Army Engineer District, Sacramento, CA.
Prepared for Board of County Commissioners, Utah County, UT June 1971, 34 p, 8 fig, 8 plates, 7 tab.

Descriptors: *Utah, *Flood profiles, *Flood data, *Peak discharge, Floods, Streamflow forecasting, Historic floods, Flood stages, Flood plains, Standard project flood, Flood protection, Non-structural alternatives, Land use, Planning, Control structures, Levees, Reservoirs, *Provo River(UT), *Rock Canyon Creek(UT), *Provo(UT), *Orem(UT), Utahing County(UT), Intermediate Regional Flood.

The study area involves the flood plains of the Provo River and Rock Canyon Creek in the vicinity of Provo and Orem, Utah County, Utah. The flood plain is devoted primarily to agricultural and recreation uses, but some residential and commercial development is beginning to take place at the lower end of the study reach. Flood data were obtained from topographic maps, field studies, historical sources, and stream gage records. Flooding may result from snowmelt or high intensity, convective-type thunderstorms. Snowmelt flooding occurs from late April through early July, while rainfall flooding occurs from May through September. Existing flood control measures include a small reservoir, some low, discontinuous levees, watershed treatment measures, and fire protection in the Basin. Another reservoir is authorized, and non-structural measures are being considered. The worst recorded flood recorded at the Prove gage occurred on May 6, 1972, discharging 2,520 cubic feet per second (cfs). At the downstream study limit during the Intermediate Regional Flood (IRF), The Provo River and Rock Canyon Creek would discharge 3,000 and 2, 100 cfs, srespectively, and would crest at 4,607 and 4,631 feet mean sea level (msl), while the Standard Project Flood (SPF) would discharge 5,200 and 3,200 cfs respectively, and would crest at 4607.5 and 4632 feet msl. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W79-00673

FLOOD PLAIN INFORMATION: COODY CREEK, MUSKOGEE, OKLAHOMA.
Army Engineer District, Tulsa, OK.
Prepared for City of Muskogee, OK, February 1973, 27 p, 7 fig, 15 plates, 5 tab.

Descriptors: *Oklahoma, *Flooding, *Flood profiles, *Flood data, *Peak discharge, *Non-structural alternatives, *Floods, Flood flow, Historic floods, Flood stages, Flow characteristics, Flood plains, Standard project flood, Flood protection, Flood plain zoning, Flood plain insurance, Building codes, Land use, Planning, Muskogee(OK), *Coody Creek(OK), Intermediate Regional Flood.

The study area includes Coody Creek and its flood plain in the vicinity of Muskogee, Oklahoma. Development of the flood plain is not extensive, although increased development pressure is anticipated. Flood data were obtained from topographic maps, field studies and historical sources. No stream gage records were available. Most floods are caused by intense thunderstorms occurring from May through October. Severe floods occurred in 1957 and 1961. In the lower study reach, the Intermediate Regional Flood (IRF) would discharge 24,400 cubic feet per second (cfs) and would rise 40.7 feet, while the Standard Project Flood (SPF) would discharge 47,100 cfs and would rise 42.7 feet mean sea level (msl). No structural flood control measures are anticipated, and non-structural measures have not been enacted. Guidelines for flood plain management are presented. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W79-00674

FLOOD PLAIN INFORMATION: HAIKEY CREEK, TULSA COUNTY, OKLAHOMA.
Army Engineer District, Tulsa, OK.
Prepared for Tulsa Metropolitan Area Planning Commission, OK, September 1973, 27 p, 5 fig, 21 plates, 5 tab.

Descriptors: *Oklahoma, *Flooding, *Flood profiles, *Flood data, *Peak discharge, *Non-structural alternatives, Floods, Flood flow, Historic floods, Flow characteristics, Flood plains, Standards Project Flood, Flood protection, Flood plain zoning, Flood plain insurance, Building codes, Land use, Planning, *Haikey Creek(OK), Tulsa County(OK), Intermediate Regional Flood.

The study area includes Haikey Creek, its tributaries, and their flood plains in Tulsa County, Oklahoma. Intensive land use in the study area is limited, although development pressure from the cities of Tulsa and Bixby is anticipated. Flood data were obtained from topographic maps, historical sources, and field studies. No stream gage records are available. The worst known flood occurred in 1943. Other large floods occurred in 1970 and 1971. Intense rainfall most frequently causes flooding from May through October. On Haikey Creek, the Intermediate Regional Flood (IRF) would discharge 18,240 cubic feet per second (cfs) and would rise 3.6 feet, while the Standard Project Flood (SPF) would discharge 30,300 cfs and would rise 5.4 feet. Historical and future flood data are also presented for the major tributaries to Haikey Creek. Twenty-seven bridges in the study area would obstruct the IRF. There are no major flood control measures contemplated for the area. Guidelines for flood plain management are presented. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W79-00675

FLOOD PLAIN INFORMATION: PRYOR CREEK AND SALT BRANCH, PRYOR CREEK, OKLAHOMA.
Army Engineer District, Tulsa, OK.
Prepared for City of Pryor Creek, OK, May 1974, 36 p, 7 fig, 14 plates, 5 tab.

Descriptors: *Oklahoma, *Flooding, *Flood profiles, *Flood data, *Peak discharge, Floods, Flood flow, Historic floods, Flood stages, Flood plains, Flood protection, Standard Project Flood, Non-structural alternatives, Land use, Planning, Control structures, *Pryor Creek(OK), Salt Branch(OK), Mayes County(OK), Intermediate Regional Flood.

The study area includes Pryor Creek, Salt Branch, and their flood plains in the vicinity of Pryor Creek, Oklahoma. Land use in the flood plain is almost exclusively agricultural. Flood data were obtained from topographic maps, field studies, historical sources and stream gage records. Most flood-producing storms occur from April through September. The worst flood recorded on Pryor Creek occurred on October 3, 1959, discharging an estimated 32,000 cubic feet per second (cfs) and cresting at 601.18 feet mean sea level (msl). In the lower reach of the study area, the Intermediate Regional Flood would discharge 70,000 cfs and would crest 15.9 feet above flood stage, while the Standard Project Flood would discharge 106,000 cfs and would crest 20.3 feet above flood stage. Historical and projected flood data are also presented for Salt Branch. A flood damage prevention measure has been proposed for the Pryor Creek watershed. No plans have been developed for Salt Branch. The City of Pryor does not regulate use of the flood plain. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W79-00676

FLOOD PLAIN INFORMATION: STILLWATER CREEK AND TRIBUTARIES, STILLWATER, OKLAHOMA.
Army Engineer District, Tulsa, OK.
Prepared for City of Stillwater,OK, June 1968, 66 p, 15 fig, 30 plates, 17 tab.

Descriptors: *Oklahoma, *Flooding, *Flood profiles, *Flood data, *Flood peak, Floods, Historic floods, Flow duration, Flow characteristics, Stage-discharge relations, Rivers, Flood plains, Flood protection, Standard project flood, Non-structural alternatives, Land use, Planning, Control structures, Reservoirs, *Stillwater Creek(OK), Stillwater(OK), Cow Creek(OK), Duck Creek(OK), East and West Boomer Creeks(OK), East and West Brush Creeks(OK), Intermediate Regional Flood.

The study area includes Stillwater Creek, its tributaries, and their flood plains in the vicinity of Stillwater, Oklahoma. Within the city, the flood plain is extensively developed. Elsewhere, the flood plain is mostly agricultural. Flood data were obtained from topographic maps, field studies, and historical sources. Stream gage records exist for only three years. The worst recorded flood on Stillwater Creek occurred in October 1959, cresting at 856.7 feet mean sea level (msl) and discharging an estimated 51,000 cubic feet per second (cfs). At the same location, the Intermediate Regional Flood (IRF) would discharge 40,100 cfs and would crest at 856.0 feet msls, while the Standard project Flood (SPF) would discharge 77,600 cfs and would crest at 860.2 feet msl. All six of the bridges crossing the creek would be obstructive to the IRF. Descriptions of the Creek's major tributaries are presented--Cow Creek, Duck Creek, East and West Boomer Creeks, East and West Brush Creeks, as well as flood data for these tributaries. This study is intended for use in making land use planning and management decisions concerning flood plain utilization. (Nessa-NC)
W79-00677

ANCESTRAL NIAGARA RIVER DRAINAGE: STRATIGRAPHIC AND PALEONTOLOGIC SETTING,
State University of New York at Buffalo. Dept. of Geological Sciences.
P. E. Calkin, and C. E. Brett.
Geological Society of American Bulletin, Vol. 89, No. 8, p 1140-1154, August 1978. 6 fig, 3 tab, 51 ref.

Descriptors: *History, *Stratigraphy, *Rivers, Lakes, Geology, Basins, Watersheds(Basins), Mollusks, Ice, Carbon radioisotopes, *Paleontology, *Niagara River, Glacial oscillation, Glaciolacustrine deposits.

The modern Niagara River was initiated as a multi-outlet river-lake system following the last ice retreat from the area about 12,300 yr B.P. This system extended from Early Lake Erie to the contemporaneously formed Galcial Lake Iroquois in the Ontario basin. The last major ice advance and one subsequent glacial oscillation associated with the ice retreat are recorded in sequences of glaciolacustrine deposits and till along the present Gorge wall and within older bedrock spillways. Dated wood overlying Iroquois silts and till within the Lockport spillway, east of Niagara, suggest that the multi-outlet (Lake Tonawanda) phase of the drainage ceased about 10,900 yr B.P. with concentration of the outflow, and hence major gorge recession, at Lewiston. Radiocarbon analysis of mollusks from river gravels at the top of the Niagara Gorge at Whirlpool Park indicated that cataract recession from Lewiston to this site of intersection with the much older buried St. Davids Gorge occurred after 9800 yr B.P. Lake Tonawanda persisted near the present site of Niagara Falls until about 1,000 yr ago; however, dated mollusks imply that deposition here was interrupted by intense scouring shortly before 3800 yr B.P., which may have been response to the closing of the North Bay outlet of the upper Great Lakes and consequent large increase in discharge through Lake Erie. Mollusks which occur in the ancient Niagara River gravels are well preserved and distinctly zoned. The Lake Tonawanda fauna, heretofore undescribed, includes about 15 species, all of which are extant in the region. (Lee-ISWS)
W79-00703

CHANNEL ROUTING BY FINITE DIFFERENCE METHOD,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W79-00704

GREAT LAKES WATER LEVELS 1974. DAILY AND MONTHLY AVERAGE WATER SURFACE ELEVATIONS.
National Ocean Survey, Detroit, MI. Lake Survey Center.
For primary bibliographic entry see Field 7C.
W79-00706

AN INTEGRATED STUDY OF EARTH RESOURCES IN THE STATE OF CALIFORNIA USING REMOTE SENSING TECHNIQUES.
California Univ., Berkeley. Space Sciences Lab.
For primary bibliographic entry see Field 7B.
W79-00711

KOLYMA WATER BALANCE STATION, MAGADAN OBLAST, NORTHEAST U.S.S.R.: UNITED STATES-SOVIET SCIENTIFIC EXCHANGE VISIT,
Forest Service (USDA), College, AK. Inst. of Northern Forestry.
For primary bibliographic entry see Field 4D.
W79-00716

EFFECT OF DEPTH ON DREDGING FREQUENCY; REPORT 1, SURVEY OF DISTRICT OFFICES,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
M. J. Trawle, and J. A. Boyd, Jr.
Technical Report H-78-5, May 1978 (Report 1 of a series). 39 p, 4 tab.

Descriptors: *Channel improvement, *Dredging, *Harbors.

Evaluates the effectiveness of advance maintenance dredging (overdepth dredging) in reducing dredging frequency and/or costs in the maintenance of coastal and inland channels and harbors, and establishes necessary guidelines for governing the practice. Defines the state of the art and presents the results of a survey of U.S. Army Engineer Corps district offices to determine the extent of the usage of advance maintenance dredging. Thirty-five Corps district offices and two division offices (no districts within the division) participated in the survey. The districts are classified as either coastal or inland. Coastal districts include a part of the coastline of the Atlantic or Pacific Ocean or the Gulf of Mexico. Inland districts do not include any of these coastalines within their boundaries. Results of the survey indicate that advance maintenance dredging is practiced on many projects in the coastal districts, particularly those along the southeast Atlantic and Gulf coasts, while it is sparingly practiced (beyond the current dredging season) in the inland districts. Advance maintenance dredging applicability is determined in most cases by previous experience with the practice and, to a lesser degree, by historical shoaling rates. (WES)
W79-00767

NUISANCE AQUATIC MACROPHYTE GROWTH,
Army Engineer District, Walla Walla, WA.
E. Hesser, and E. O. Gangstad.
Journal of Aquatic Plant Management, Vol. 16, p 11-13, June 1978. 1 fig, 2 tab., 7 ref. DACW 68-72-C-0269.

Descriptors: *Pacific Northwest U.S., *Aquatic weeds, *Macrophytes, *Columbia River, *Snake River, *Habitats, Land use, Washington, Oregon, Idaho, Montana, Watersheds(Basins), Altitude, Water temperature, Coasts, Surveys, Agricultural runoff, Pastures, Urban runoff, Elodea, Potamogeton, Chara, Ranuculus, Ceratophyllum, Myriophyllum, Nitella, Nuphar.

A survey of aquatic nuisance macrophytes at 723 sites in the Columbia and Snake River watersheds in Washington, Oregon, and Idaho (April-September 1973) showed 70% of specific problems were caused by eight genera: Elodea, Potamogeton, Chara, Ranuculus, Ceratophyllum, Myriophyllum, Nitella, and Nuphar. Sites, classified according to adjacent land use, water body type, altitude, water temperature, and nuisance growth, were subjected to matrix analysis. Nuisance weed growths were heaviest near population centers, near intensively grazed pastures, or in water bodies receiving irrigated agricultural runoff. Sites were selected on the basis of diversity of habitat and plant species, and of high standing crops of nuisance aquatic vegetation. Most taxa showed little apparent geographical or river basin zonation, and all problem taxa were very widespread. The presence or absence of a taxon in a specific river drainage depended on suitability of the habitat rather than being a function of prior introduction. Certain habitats were strongly related to heavy macrophyte growth: 60% of small ponds and 53.7% of small lakes had heavy growths, while only 30% of large lakes, 28.7% of rivers, and 11.4% of drawdown reservoirs had heavy growths. Drawdown pools and rivers generally were poor plant habitats. Aquatic weed problems were most common at lower altitudes and higher temperatures. Elodea, Nitella, and Nuphar had little or no correlation with land use or type of water body. (Lynch-Wisconsin)
W79-00769

ENVIRONMENTAL EFFECTS OF MECHANICAL HARVESTING,
Ontario Ministry of the Environment, Rexdale. Water Resources Branch.
I. Wile.
Journal of Aquatic Plant Management, Vol. 16, p 14-20, June 1978. 3 fig, 6 tab, 14 ref.

Descriptors: *Mechanical control, *Harvesting, *Chemung Lake(Ontario Canada), *Aquatic weed control, *Eurasian water milfoil, *Eutrophication, *Nutrient removal, Phosphorus, Myriophyllum spicatum, Myriophyllum exalbescens, Vallisneria americana, Macrophytes, Submerged plants, Phytoplankton, Algae, Nutrients, Lakes, Ontario(Canada), Canada, Runoff, Shallow water, Limiting factors, Fisheries, Recreation, Environmental effects.

Experimental harvesting of nuisance aquatic plants, particularly Eurasian water milfoil (Myriophyllum spicatum), was conducted 1973-75 in southern Chemung Lake, near Peterborough, Ontario, Canada, as an alternative to chemical treatment. In 1973, 1290 metric tons were removed from 266 ha, 2160 metric tons from 262 ha in 1974, and 3380 metric tons from 297 ha in 1975. M. spicatum, M. exalbescens, and Vallisneria americana dominated among submerged macrophytes, which covered some 430 ha (50%) of the surface of southern Chemung Lake. Although a marked growth of M. spicatum with concurrent reductions in M. exalbescens and Vallisneria throughout the lake system complicated evaluation of harvesting effects on plants, growth rates appeared lower in harvested areas. Peak annual biomass values were similar during the study period, ranging from 300-400 g dry wt/sq m. In 1975 harvested plants contained 560 kg phosphorus, equivalent to 47% of gross and 92% of net annual phosphorus loading to southern Chemung Lake. Significant reductions in phytoplankton biomass resulted from harvesting, from 2400-4700 in 1972 to 1750-2100 in 1976. Fish populations were unaffected by the harvesting. In experimental plots, multiple harvests effectively reduced stem densities of M. spicatum. Notably different results of harvesting at Lake Sallie, Minnesota are due to several environmental differences. (Lynch-Wisconsin)
W79-00770

MACROPHYTE CONTROL BY HARVESTING AND HERBICIDES: IMPLICATIONS FOR PHOSPHORUS CYCLING IN LAKE WINGRA, WISCONSIN,
Wisconsin Univ.-Madison. Dept. of Botany.
For primary bibliographic entry see Field 5G.
W79-00771

AQUATIC WEED MANAGEMENT BY BENTHIC SEMI-BARRIERS,
State Univ. of New York Coll. at Fredonia. Environmental Resources Center.
R. J. Mayer.
Journal of Aquatic Plant Management, Vol. 16, p 31-33, June 1978. 1 tab, 14 ref.

Descriptors: *Aquatic weed control, *Methodology, *Screens, *Barriers, *Rooted aquatic plants, *Mechanical control, Myriophyllum exalbescens, Potamogeton crispus, Chautauqua Lake(NY), New York, Equipment, Semi-barriers, Fiberglass, Eutrophication, Lakes, Shallow water, Littoral, Benthos, Water management.

A control method for rooted aquatic weeds using a bottom covering of closely woven (62 apertures/sq cm) polyvinyl chloride-coated fiberglass screening resulted in 95% plant eradication in 2-3 weeks, and 95% long-term weed-free maintenance. No adverse ecological effects were detected, and fish,

attached algae, and benthic fauna (especially fish food organisms) were observed over or on the screens. Unlike impermeable polyethylene sheeting, the fiberglass mesh semi-barrier permits exchange of dissolved nutrients and gases between benthic communities and the overlying water column. The tests were conducted 1973-77 in Chautauqua Lake, New York, a shallow eutrophic lake producing intensive littoral weed communities each summer and fall dominated by American water milfoil (Myriophyllum exalbescens) in the northern basin and curly leaf pondweed (Potamogeton crispus) in the southern basin. Mesh sizes of 9.9, 39, and 62 apertures/sq cm were used. The 39-aperture mesh absorbs 49% of incident radiation, while 62-aperture screening absorbs 60%. Screens were affixed with bricks or T-bars. The 62-aperture mesh was most effective (85-95%), followed by 39-aperture (40-60%) and 9.9-aperture (20%). Regrowth with 62-aperture mesh was limited to dwarf plants, while the 39-aperture mesh was less effective in controlling long-term growth. Sedimentation on top of screens resulted in some regrowth; this could be eliminated by removing and repositioning the screens annually. (Lynch-Wisconsin)
W79-00774

COMPARATIVE EFFECTS OF GRASS CARP AND SELECTED HERBICIDES ON MACROPHYTE AND PHYTOPLANKTON COMMUNITIES,
Florida State Game and Fresh Water Fish Commission, Eustis. Eustis Fisheries Research Lab.
For primary bibliographic entry see Field 5C.
W79-00778

AN APPROACH TO ESTIMATING THE STANDING CROP OF WATERHYACINTH,
Commonwealth Scientific and Industrial Research Organization, Brisbane (Australia). Long Pocket Labs.
For primary bibliographic entry see Field 5G.
W79-00779

EFFECT OF PH ON THE NATURE OF COMPETITION BETWEEN EICHHORNIA CRASSIPES AND PISTIA STRATIOTES,
Khartoum Univ. (Sudan).
For primary bibliographic entry see Field 5C.
W79-00780

THE EFFECT OF DAYLENGTH AND TEMPERATURE ON HYDRILLA GROWTH AND TUBER PRODUCTION,
Florida Univ., Gainesville.
For primary bibliographic entry see Field 5C.
W79-00781

TRADITIONAL LAND USE IN MARGINAL DRYLANDS,
United Nations Environment Programme, Nairobi (Kenya); and Secretariat for International Ecology (Sweden).
A. Hjort.
Ecological Bulletin (Stockholm), Vol. 24, p 43-53, 1976. 3 fig, 1 tab, 9 ref.

Descriptors: *Land use, *Nomads, *Marginal productivity, Agriculture, Dry farming, Migration, Land tenure, Land management, Rural sociology, Motivation, Pastoralism, Psychological aspects, Decision making, Kenya, Sudan.

Land use patterns of nomadic, semi nomadic and transhumat populations inhabiting marginal areas are analyzed here. Although this categorization is not always useful, it is helpful to analyze land use strategies of those living in marginal lands as they have been found to adopt practices that are defined by local limitations. A distinction between pastoralists and agricultural groups must be made as the focus of the social, economic and political organization of the two is basically different. Two land use strategies based upon local conditions are outlied to demostrate two typical kinds of economics. The Samburu nomads northwest ofMt. Kenya are analyzed to illustrate pastoralism and diversification, and the Nuer people of the southern Sudan are described to demonstrate hoe cultivation, transhumace and pastoralism. The recurrent point emerging from this analysis is that land use strategies in marginal areas are aimed at dispersing local resources so as to minimize risks. (Tickes-Arizona)
W79-00797

DESERT TRANSFORMATION IN CHINA.
Academia Sinica, Taipei (Taiwan). Dept. of Desert Research.
Scientia Sinica, Vol. 21, No. 2, p 251-278, March-April 1978. 18 tab, 3 ref.

Descriptors: *Deserts, *Dunes, *Shelterbelts, *Range management, *China, Sands, Grazing, Irrigation practices, Pasture management, Vegetation establishment, Water conservation, Land conservation, Biomes, Terrestrial habitats, Climatic zones, Forest management, Reservoir construction, Drainage systems, Land reclamation, Irrigation canals.

Desert areas in China are situate mainly in the northern parts of the country and cover and area of 1,095,000 Km2, accounting for 11.4% of the total land area. Various degrees of desertification adre found in the PRC due mainly to the numerous bioclimatic zones. Accordingly, several management approaches have been developed and applied to localized areas. For instance, shelterbelts of trees and grsses have been applied in sandstorm areas to anchor the sand and protect natural vegetation. pasture in themore humid stepe zones are carefully protected from overgrazing by nomadic animals, and desert areas with more abundent water and land resources have been chosen for construction of major engineering works such as reservoirs, canals and irrigation and drainage systems. Recent efforts include the most modern desert-adapted cultural practices and techniques. Previously barren and unusable land is now being used productively in China while further efforts in this direction continue at a raped pace. (Tiches-Arizona)
W79-00798

STREAMFLOW MODELING OF UPPER INDUS RIVER CATCHMENTS,
Asian Inst. of Tech., Bangkok (Thailand). Div. of Water Resources Engineering.
S. Selvalingam, and A. Masood.
Water Resources Bulletin, Vol. 14, No. 4, p 827-841, August, 1978. 11 fig, 6 ref.

Descriptors: *Streamflow, *Channel flow, *Model studies, Flow, Hydrographs, Simulation analysis, Rainfall-runoff relationships, Structural models, Analytical techniques, Theoretical analysis, Indus River, Pakistan, Snowmelt, *Alteration of flow, *Routing, Evaluation, Upstream, Downstream.

Streamflow in three tributarics of the upper Indus River catchment in Pakistan, The Siran, Haro, and Soan is simulated in this analysis using two models the Synthesis and Reservoir Regulation model (SSARR) developed by the U.S. Corp of Engineers and the Tank model designed by Sugawara (1961). These models are also used here for channel-routing of the main stream for a stretch of about eighty miles. The SSARR model, developed in 1972, allows for the synthesis of streamflow by evaluation of snowmelt and rainfall and consist of two basic components: (1) a generalized river basin model for synthesizing runoff from rainfall, and (2) a river systems model for routing stremflows from usptream to downstream points through channel and lake storage. The tank model used here consists of several tanks laid out in either a vertical or parallel series with outlets and at the bottoms and sides, depending upon whether the area of application is humid or non humid. Data for the 1964-1970 period was used to verify basin characteristics that were derived through trial and error. Results showed the SSARR model to be superior in simulating low flows while the two models were of equal accuracy in the handling of high flows. (Thickes-Arizona)
W79-00800

SALINISATION IN THE SOUTHWEST OF WESTERN AUSTRALIA,
Western Australia Dept. of Conservation and Environment, Perth.
For primary bibliographic entry see Field 3C.
W79-00803

DESERT DEVELOPMENT IN THE V. I. LENIN KARAKUM CANAL ZONE,
Desert Inst., Ashkhadad (USSR).
A. Babaev, and Z. Freikin.
Social Sciences Today, Editorial Board, USSR Academy of Sciences, p 29-38, Moscow, 1977.

Descriptors: *Canal design, *Canal construction, *Conveyance structures, Water conservation, Channels, Water management, Arid lands, Deserts, Area redevelopment, Governmental interrelations, Political aspects, Agriculture, Economic justification, Social participation, Social impact, Community development, *USSR, *Karakum Canal.

The historical development of irrigation and land reclamation programand projects in the Soviet Union since 1918 are trced in an effort to illustrate that the scientific and technological revolution under developed socialism has facilitated the development of the deserts in the southern regions of the USSR. The planning, cinstruction and operation of one of these projects, the Karakum Canal, are discussed here in support ofthis thesis. First planned in 1906, this man-made canal now stretches for more than 1,000 Km. Bringing water from the Amudarya to virgin and old fallow land, the canal has made obsolate the once used shifting cultivation practices, facilitated livestock husbandry, and increased alfalfa sown land which replaces the previous noncultural farming based on cotton. Social, economic and political effects ofthe canal are discussed in this analysis to illstrate the strategies of the communist party and the Soviet government in managing the desert regions. (Tickes-Arizona)
W79-00805

NON-AGRICULTURAL LAND USE AND DESERTIFICATION,
Department of Environment, Housing and Community Development, Canberra(Australia).
P. Freer.
SEARCH, Vol. 9, No 7, p 276-280, July, 1978. 5 fig, 15 ref.

Descriptors: *Mining, *Recreation, Deserts, *Desertification, Mine wastes, Spoil banks, Mining engineering, Land management, Land reclamation, Reclamation, Recreation wastes, Economics, Project planning, Economic justification, Management, Social impact, Social aspects, Social participation, Arid lands, Water reuse.

Mining and recreational activities present a real and permanent danger to the biological productivity of arid regions throughout the world. Analized in this paper are the means by which these activities lead to desertification and alternative techniques to reverse these processes. Unlike other forms of land use, the initial effects of mining and recreation activities are localized and obvious, facilitating the developmet of plans to combat their environmental impact. Mining in Australia is an important economic activity, Accounting for 27% of her total exports. Major vegetation, access road construction and use, spoil dumps and human

activities associated with the mines. Techniques developed to manage affected areas are aimed at protection and stabilization of local ecosystems so that desertification is minimized. In arid Australia where tourism is popular, technicians have had to develop plans to reduce the pressure people are exerting upon local sites. These plans have included relocation of villages and roads, construction of viewing platforms, fences, and the reseeding of native but destroyed vegetation. The use of waste water in these rehabilitation efforts is of prime importance, both in the reduction of mine spoils and revegetation. Prompt planning and apropriate controls such as these have proven to be effective tools in reducing desertification processes caused by mining and recreational activities in Australia. (Tickes-Arizona)
W79-00806

WATERLOGGING AND SALINISATION IN IRRIGATED SEMI-ARID REGIONS OF NSW,
For primary bibliographic entry see Field 3C.
W79-00812

DESERTIFICATION IN THE PASTORAL RANGELANDS OF THE GASCOYNE BASIN, WESTERN AUSTRALIA,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Resources Management, Canberra (Australia).
For primary bibliographic entry see Field 3F.
W79-00814

THE EVOLUTION OF THE AUSTRALIAN DESERTS,
Sydney Univ. (Australia). Dept. of Geography.
T. L. Smith.
Arid Lands Newsletter, No 5, p 1-7, March 1977. 8 fig, 6 ref.

Descriptors: *Australia, *Playas, Lake basins, *Deserts, *Arid lands, *Geomorphology, Geologic history, Geologic formations, Geologic surveys.

Desertification, as it has affected one-third of the Australian continent, is discussed here not in terms of land management but rather in terms of natural history and environment. It is this author's belief that much of the desert encroachment in Australia could have been avoided with a better understanding of the Landforms present and their evolution; accordingly, a brief natural history of Australian desert landforms is presented followed by a discussion of the four principal types of deserts: the mountain deserts, shield deserts, stony deserts and sand deserts. Playas by the thousands dot the arid landscapes of Australia, usually dry, but occasionally full from unusual rains. Geologic evidence reveals that they were once larger and filled with permanent water. Having outlined and explained the distinctive features of each principal desert type, this author provides a brief geologic history of these formations from the late Jurassic period (ca. 150 to ca. 136 million years B.P.) to present. (Tickes-Arizona)
W79-00815

STRATEGY FOR THE DEVELOPMENT AND MANAGEMENT OF DESERTS.
Science and Public Policy, Vol. J, No. 1, p 56-62, Feb. 1978.

Descriptors: *Arid lands, *Deserts, *Land management, *Water resources development, Water management(Applied), Range management, Water conservation, Climatology, Social values, Technology transfer, Political aspects, Institutions, Planning.

Reported here are the recomendations of the Sacramento conference on alternative strategies for desert development and management (1977). Basic factors leading to desertification are defined as: (1) population growth resulting in increased flock size ad overgrazing, (2) destructive land and water management, (3) climatic variation as well as long-term change, and (4) social, politcal and cultural factors. Examples of desertification processes and technologies for improvement are presented from both developed and developing contries with emphasis placed upon the need to adapt existing technology to local conditions. Under the heading of water management specifically, recognition of the fact that institutional and political solutions as well as technological answeres must be sought was paramount. Long range planning for the beneficial use of fossil groundewater, techniques to maximize effective use of available water through improved irrigation techniques, evaporation control, salinity control ad drainage, ad water harvesting to maximize rainfall use, were discussed. (Tickes-Arizona)
W79-00818

DESERTIFICATION OF AUSTRALIA IN ITS GLOBAL CONTEXT,
New South Wales Univ., Kensington.
For primary bibliographic entry see Field 6G.
W79-00819

WATER LEVEL MEASUREMENT DEVICE,
C. B. Shuler, and W. E. Moore, Jr.
U.S. Patent No. 4,090,407, 4 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 970, No 4, p 1239, May 23, 1978.

Descriptors: *Patents, *Water levels, *Measurement, Ultrasonics, Sound waves, Instrumentation, Electronic equipment.

The invention utilizes a technique of water level measurement including electronic and ultrasonic means. The device solves the problem of variable speed of sound by use of a fixed insert within a hollow, oblong structure which provides a standard by which comparison techniques may determine the accurate level of the water. The device comprises a hollow, oblong structure with an open end. The structure is secured with the open end in the water. A signal sending and receiving means is secured onto the hollow, oblong structure. An insert containing a hole is secured within the structure. The insert is operative to reflect a signal from the sending and receiving means back to the sending and receiving means through the structure. Portions of the signal pass through the hole in the insert without being reflected and proceed to be reflected by the water in the open end of the structure. Electronic means are connected to the signal sending and receiving means. The electronic means are operative to determine and compare the length of time the signal is sent and returned from the insert and from the water. From the comparison of the length of time the signal returned from the insert and from the water, the level of the water may be determined. (Sinha-OEIS)
W79-00822

ECONOMIC BENEFITS TO AGRICULTURE IN THE SAN JOAQUIN VALLEY DUE TO LONG-TERM PREDICTION STREAMFLOW FORECASTING,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 3F.
W79-00861

WHAT CONSTITUTES 'BENEFITS' FOR URBAN DRAINAGE PROJECTS,
Shoemaker and Wham, Denver, CO.
For primary bibliographic entry see Field 6B.
W79-00872

VISUAL LAND USE COMPATIBILITY AS A SIGNIFICANT CONTRIBUTOR TO VISUAL RESOURCE QUALITY,
Massachusetts Univ., Amherst. Dept. of Landscape Architecture and Regional.
For primary bibliographic entry see Field 6B.
W79-00873

WORKING PAPER NOS. 7 - 10 OF THE EMERGENCY WATER ALLOCATION PROJECT, (7) IMPLEMENTATION OF A PREPAREDNESS PROGRAM; (8) ACHIEVING EQUITABLE AND EFFECTIVE WATER ALLOCATION; (9) RESTORATION OF A WATER DISTRIBUTION NETWORK; (10) IMPROVING EMERGENCY PREPAREDNESS,
California Univ., Irvine. School of Engineering; and California Univ., Irvine. Graduate School of Administration.
R. Schinzinger, H. Fagin, T. Edwards, and G. Urbach.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 404, Price codes: A05 in paper copy, A01 in microfiche. November 1977. Working Paper No. 7, 15 p; Working Paper No. 8, 17 p; Working Paper No. 9, 28 p; Working Paper No. 10, 15 p. (California Water Resources Center Project UCAL-WRC-W-495). OWRT B-175-CAL(1).

Descriptors: *Water shortage, *Water supply, *Potential water supply, *Rationing(Water), Water management(Applied), California, Municipal water, Water distribution(Applied), Water allocation(Policy), *San Diego(Calif).

Communities which must rely on single sources of water are very vulnerable to disruptions of their sources. Many such communities are found in Southern California where long aqueducts, never too far from earthquake faults, constitute the main link to remote rivers and dams. The many considerations which arise indicate the need to prepare emergency plans before a disaster strikes. Working Paper No. 7 states the emergency problems and describes the development of an emergency plan for a particular agency. Working Paper No. 8 discusses alternative measures for allocation of water in an emergency. Rapid restoration of water service in a system which has incurred physical damage requires effective allocation of available personnel, equipment, and supplies to the needed repairs. Priorities among the repairs may vary from user criticality to the most efficient utilization of equipment. Working Paper No. 9 discusses different allocation policies from which may be selected the appropriate set which will match the pattern of disruption. Working Paper No. 10 discusses common causes of failure in organized response to disaster and presents preparedness activities designed to reduce the potential for failures in the emergency response system. (Snyder-Calif, Davis)
W79-00919

WORKING PAPER NO. 11 OF THE EMERGENCY WATER ALLOCATION PROJECT, MANUAL FOR WATER SERVICE EMERGENCIES FOR THE POWAY MUNICIPAL WATER DISTRICT,
California Univ., Irvine. School of Engineering; and California Univ., Irvine. Graduate School of Administration.
R. Schinzger, H. Fagin, T. Edwards, and G. Urbach.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 343, Price codes: A05 in paper copy, A01 in microfiche. Working Paper No. 11, November 1, 1977, 85 p, 12 append. (California Water Resources Center Project UCAL-WRC-W-495) OWRT B-175-CAL(2).

Descriptors: *Water shortage, *Water supply, *Potential water supply, *Rationing(Water), Water management(Applied), California, Water allocation(Policy), *Water distribution(Applied), *San Diego(Calif), Poway Municipal Water Dist(Calif).

This manual provides guidelines to be used by the staff of the Poway Municipal Water District during

maor water service emergencies. It addresses problems which occur when service to a large portion of users is interrupted to the extent that the health and welfare of the community may be affected. Allocation of the available wate, restoration of service, and liaison with the community or with other agencies are but some of the tasks faced by District personnel during such an emergency. The purpose of this manual is partly to serve as a checklist or handbook of reference during periods of crisis, and partly to suggest measures and exercises in preparation for emergencies. (Snyder-Calif Davis)
W79-00920

AN OUTLINE FOR THE STUDY OF EMERGENCY WATER ALLOCATION PROCEDURES,
California Univ., Irvine. School of Engineering.
R. Schinzinger, and H. Fagin.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 521, Price codes: A03 in paper copy, A01 in microfiche. Emergency Water Allocation Project, School of Engineering, Univ. of Calif., Irvine, Working Paper No. 1, Aug 1976. 36 p, 5 fig, 4 tab, 65 ref. (Calif. Water Resources Center Project UCAL-WRC-W-498) OWRT-B-178-CAL(1).

Descriptors: *Water shortage, Water supply, *Potential water supply, *Water management(Applied), California, *San Diego(Calif).

This report describes the need and gives an outline of our study of contingency measures for water emergencies. It deals in particular with the San Diego area. (Snyder-Calif Davis)
W79-00921

A CONCEPTUAL MODEL OF THE WATER DELIVERY SYSTEM IN THE SAN DIEGO AREA,
California Univ., Irvine. School of Engineering.
R. Chee, and M. E. Slafkes.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 482, Price codes: A02 in paper copy, A01 in microfiche. Emergency Water Allocation Project, School of Engineering, Univ. of Calif., Irvine, Working Paper No. 2, August 1976. 9 p, 4 fig, (Calif. Water Resources Center Project UCAL-WRC-W-498). OWRT-B-178-CAL(2).

Descriptors: *Water supply, *Water shortage, *Water management(Applied), *Potential water supply, California, *Model studies, *Regional analysis, *San Diego(Calif).

This report presents a set of models which describes a regional water supply system. The models are useful in identifying concepts and relationships which apply to the normal operating mode as well as for emergency conditions. (Snyder-Calif, Davis)
W79-00922

THE CURRENT STATE OF EMERGENCY PLANNING FOR WATER SUPPLY IN THE SAN DIEGO AREA,
California Univ., Irvine. School of Engineering.
R. Chee.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 468, Price codes: A02 in paper copy, A01 in microfiche. Emergency Water Allocation Project, School of Engineering, Univ. of Calif., Irvine, Working Paper No. 3, July 1976. 10 p, 1 tab, 21 ref. (Calif. Water Resources Center Project UCAL-WRC-W-498). OWRT-B-178-CAL(3).

Descriptors: Water resources, *Planning, *Water shortage, *Water supply, Water management(Applied), Potential water supply, California, *San Diego(Calif).

This report describes the present state of planning for water supply emergencies in the San Diego area and how various agencies would be prepared to respond. (Snyder-Calif, Davis)
W79-00923

EMERGENCY WATER ALLOCATION LITERATURE: SOURCES AND RETRIEVAL,
California Univ., Irvine. School of Engineering.
M. E. Slafkes, and T. H. Edwards.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 485, Price codes: A03 in paper copy, A01 in microfiche. Emergency Water Allocation Project, School of Engineering, Univ. of Calif., Irvine, Working Paper No. 4, August 1976. 18 p. (Calif. Water Resources Center Project UCAL-WRC-W-498). OWRT-B-178-CAL(4).

Descriptors: Water resources, *Planning, *Water shortage, *Water supply, *Potential water supply, *Water management(Applied), Computer programs, California, *San Diego(Calif).

This report serves as a guide to the many printed and computerized sources of data and abstracts, with special emphasis on topics related to emergency water allocation. (Snyder-Calif, Davis)
W79-00924

EWAP DATA ACCESS SYSTEM - A MANUAL FOR THE USE OF THE EDGE PUNCH CARD FILE,
California Univ., Irvine. School of Engineering.
R. Chee, and M. E. Slafkes.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 418, Price codes: A02 in paper copy, A01 in microfiche. Emergency Water Allocation Project, School of Engineering, Univ. of Calif., Irvine, Working Paper No. 5, August 1976. 10 p. (Calif. Water Resources Center Project UCAL-WRC-W-498). OWRT-B-178-CAL(5).

Descriptors: *Computer programs, Water resources, *Planning, *Water shortage, *Water supply, Potential water supply, Water management(Applied), California, *San Diego(Calif).

Documents pertaining to emergency water allocation procedures are identified and obstracted on edge-punch cards. These cards form the basis the EWAP Data Access System. This is a manual for use of the card file. (Snyder-Calif, Davis)
W79-00925

THE TRENTON WATER CRISIS OF 1975: IMPRESSIONS AND ANALYSIS,
California Univ., Irvine. School of Engineering.
M. E. Slafkes, H. Fagin, and R. Schinzinger.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 522, Price codes: A04 in paper copy, A01 in microfiche. Emergency Water Allocation Project, School of Engineering, Univ. of Caif., Irvine, Working Paper No. 6, July 1976. 60 p. (Calif. Water Resources Center Project UCAL-WRC-W-498). OWRT-B-178-CAL(6).

Descriptors: *Water shortage, Water resources, *Planning, *Attitudes, *Phychological aspects, Decision making, Social aspects, New Jersey, *Trenton(NJ).

This report on the water shortage which occurred in and around Trenton, New Jersey, in September 1975 is based on personal observations, newspaper stories, and official documents. A chronological account conveys the atmosphere of an emergency in which acts of generous assistance occur in the midst of confusion that inevitably accompanies any crisis involving a multitude of agencies. The reactions of the authorities, the public, and the press are probed in a brief analysis of events leading up to and following the failure of the pumps at the filtration plant. (Snyder-Calif, Davis)
W79-00926

A FLASH FLOOD AID - THE LIMITED AREA QPF,
National Weather Service, Fort Worth, TX. Southern Region.
For primary bibliographic entry see Field 2B.
W79-00994

WATER CONSERVATION INFORMATION DISSEMINATION DURING 1977 DROUGHT EMERGENCY,
Utah Center for Water Resources Research, Logan.
For primary bibliographic entry see Field 3B.
W79-01000

4B. Groundwater Management

A GROUNDWATER RECHARGE MODEL AND APPLICATION TO A SMALL WATERSHED,
Nebraska Univ., Lincoln.
For primary bibliographic entry see Field 2F.
W79-00508

A PROPOSED REVISION OF KENTUCKY'S WATER RIGHTS LEGISLATION,
Kentucky Water Resources Research Inst., Lexington.
For primary bibliographic entry see Field 6E.
W79-00524

EVALUATION OF ULTRAVIOLET/OZONE TREATMENT OF ROCKY MOUNTAIN ARSENAL (RMA) GROUNDWATER (TREATABILITY STUDY),
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5D.
W79-00538

FEDERAL RESERVATION OF GEOTHERMAL RESOURCES,
R. M. Silver.
Natural Resources Journal, Vol. 18, No. 1, p 213-16, January, 1978.

Descriptors: *Geothermal studies, *Reservation doctrine, *Public lands, *Judicial decisions, Federal government, United States, Legislation, Steam, California, Legal aspects, Energy.

There have been recent developments in the area of federal reservation of geothermal resources. In 1977, the Ninth Circuit Court of Appeals held that geothermal resources are included in mineral reservations to the United States under the Stock-Raising Homestead Act (Act). Consequently, they are not subject to development by the owner of the surface estate. This case comment on United States v. Union Oil Company explores the court's reasoning in reaching its holding. The case arose when Union Oil sought to develop wells on land owned under the Act in order to produce geothermal steam for generating electricity. The Act grants surface ownership to private individuals while reserving mineral interests in the United States. In order to determine the extent of the reservation, the court examined the legislative history of the Act to reach its interpretation of the Act. The intent of the Act is to retain sources of energy for the government. This case significantly widens the definition of 'mineral interst.' The implications of the case could be great because geothermal resources may be in great demand for future energy needs. The Ninth Circuit decision is being appealed to the Supreme Court. (Quarles-Florida)
W79-00613

AVAILABILITY AND QUALITY OF GROUND WATER IN THE WINSTON AREA, DOUGLAS COUNTY, OREGON,
Geological Survey, Portland, OR. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00620

POTENTIAL EFFECTS OF DEEP-WELL WASTE DISPOSAL IN WESTERN NEW YORK,
Geological Survey, Albany, NY. Water Resources Div.
For primary bibliographic entry see Field 5B.
W79-00625

GROUND-WATER DEPLETION, IN FEET, ALLOWED IN A PART OF CURRY COUNTY, NEW MEXICO, BY U.S. INTERNAL REVENUE SERVICE FOR CALENDAR YEAR 1977,
Geological Survey, Albuquerque, NM. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00627

GROUND-WATER DEPLETION, IN FEET, ALLOWED IN NORTHERN LEA COUNTY, NEW MEXICO, BY U.S. INTERNAL REVENUE SERVICE FOR CALENDAR YEAR 1977,
Geological Survey, Albuquerque, NM. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00628

GROUND-WATER DEPLETION, IN FEET, ALLOWED IN CENTRAL LEA COUNTY, NEW MEXICO, BY U.S. INTERNAL REVENUE SERVICE FOR CALENDAR YEAR 1977,
Geological Survey, Albuquerque, NM. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00629

GROUND-WATER DEPLETION, IN FEET, ALLOWED IN PORTALES VALLEY, ROOSEVELT COUNTY, NEW MEXICO, BY U.S. INTERNAL REVENUE SERVICE FOR CALENDAR YEAR 1977,
Geological Survey, Albuquerque, NM. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00630

WATER RESOURCES OF NORTHEAST NORTH CAROLINA,
Geological Survey, Raleigh, NC. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00631

TOWARD A RATIONAL DEVELOPMENT OF ARTIFICIAL-RECHARGE RESEARCH,
Geological Survey, Lubbock, TX. Water Resources Div.
W. W. Wood.
In: Advances in Groundwater Hydrology: American Water Resources Associations, p 243-247, September 1976.

Descriptors: *Artificial recharge, *Groundwater recharge, *Water management(Applied), *Aquifer characteristics, *Water quality, Recharge wells, Injection wells, Chemical properties, Biochemical properties, Water chemistry, Water transfer.

Artificial recharge can be an effective water-management technique if the hydrogeologic conditions of the aquifer system are quantified and if rational design criteria are established. The successful application of artificial recharge depends upon the development of methods for evaluating the changes in aquifer characteristics in both the saturated and unsaturated zones as a function of chemical, biological, and physical changes associated with the introduction of foreign water into the subsurface environment. Also, additional methods need to be developed to predict resulting variations of water quality in time and space. (Woodard-USGS)
W79-00632

WATER RESOURCES DATA FOR HAWAII AND OTHER PACIFIC AREAS, WATER YEAR 1977--VOLUME 2. TRUST TERRITORY OF THE PACIFIC ISLANDS, GUAM, AMERICAN SAMOSA, AND NORTHERN MARIANA ISLANDS.
Geological Survey, Honolulu, HI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00640

WATER RESOURCES DATA FOR HAWAII AND OTHER PACIFIC AREAS, WATER YEAR 1977--VOLUME 1. HAWAII.
Geological Survey, Honolulu, HI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00641

WATER RESOURCES DATA FOR MICHIGAN, WATER YEAR 1977.
Geological Survey, Lansing, MI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00642

WATER RESOURCES DATA FOR NORTH DAKOTA, WATER YEAR 1977.
Geological Survey, Bismarck, ND. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00643

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1977.
Geological Survey, Lincoln, NE. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00644

OCCURRENCE, QUALITY, AND AVAILABILITY OF GROUND WATER IN JONES COUNTY, TEXAS,
Texas Dept. of Water Resources, Austin.
For primary bibliographic entry see Field 2F.
W79-00709

CALCULATION OF DAILY GROUNDWATER LEVELS IN SWAMPS USING METEOROLOGICAL DATA,
S. M. Novikov.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 548, Price codes: A03 in paper copy, A01 in microfiche. Technical Translation 72-51102, Indian National Documentation Centre, New Delhi, 1976. Translated from Trudy Gosudarstvennogo Gidrologicheskogo Instituta, Vol 126, p 48-64, 1965. 28 p. 3 fig, 6 tab, 8 ref.

Descriptors: *Groundwater, *Water levels, *Swamps, *Model studies, Mathematical models, Meteorological data, Precipitation(Atmospheric), Evaporation, Solar radiation, Soil water, Infiltration, Foreign research, Hydrology, USSR.

Further development and perfection of the method of calculating daily groundwater levels in undrained swamps using meteorological data were described. Special calculation graphs and examples of their practical application for calculating swamp waters in different types of swamp massifs were described. (Sims-ISWS)
W79-00715

SULFUR GAS REMOVING AND SOLID PARTICLE FILTER FOR WELL WATER,
For primary bibliographic entry see Field 5F.
W79-00821

INTERFERENCES IN TRACE CONTAMINANT REMOVAL BY ADSORPTION FROM WATER FOR GROUNDWATER RECHARGE,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W79-00858

ECONOMIC BENEFITS TO AGRICULTURE IN THE SAN JOAQUIN VALLEY DUE TO LONG-TERM PREDICTION STREAMFLOW FORECASTING,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 3F.
W79-00861

NITROGEN FERTILIZER MANAGEMENT OF A LEMON ORCHARD AS RELATED TO NITRATE-POLLUTION POTENTIAL OF GROUND WATER,
California Univ., Riverside. Dept. of Soil Science and Agriculture Engineering.
For primary bibliographic entry see Field 5B.
W79-00899

COMPUTER ANALYSIS OF THE WATER BUDGET OF THE PROPOSED OAK OPENINGS NEW TOWN, LUCAS COUNTY, OHIO,
Toledo Univ., OH.
For primary bibliographic entry see Field 4C.
W79-00902

4C. Effects On Water Of Man's Non-Water Activities

A METHOD FOR ESTIMATING THE REGIONAL EFFECTS OF LAND USE ON RIVER-WATER QUALITY, SUSQUEHANNA RIVER BASIN, PENNSYLVANIA AND NEW YORK,
Geological Survey, Portland, OR. Water Resources Div.
For primary bibliographic entry see Field 5C.
W79-00622

AN INTEGRATED STUDY OF EARTH RESOURCES IN THE STATE OF CALIFORNIA USING REMOTE SENSING TECHNIQUES.
California Univ., Berkeley. Space Sciences Lab.
For primary bibliographic entry see Field 7B.
W79-00711

THE USE OF BENTHIC MACROINVERTEBRATES AS INDICATORS OF LOGGING IMPACT ON STREAMS WITH AN EVALUATION OF BUFFER STRIP EFFECTIVENESS,
California Univ., Berkeley. Dept. of Forestry and Conservation.
J. D. Newbold.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 434, Price codes: A06 in paper copy, A01 in microfiche. PhD Thesis, February 1977. 103 p, 81 ref, 5 append. (Water Resources Center Project UCAL-WRC-W-411) OWRT A-047-CAL(2).

Descriptors: *Benthic fauna, *Microorganisms, *Lumbering, Forest management, Invertebrates, Indicators, *Buffer strips, Streams, *California, Watersheds(Basins), Watershed management, Pri-

mary productivity, Clear-cutting, Sampling, Pollutant identification.

Benthic samples were taken from 83 stations in 55 streams in mountains of northern California between May and September 1975. Stations were in logged and unlogged watersheds, and above, in, and below reaches disturbed by logged road crossings. Nine streams in logged watersheds were not protected by buffer strips, while 14 had buffers from 3 to 60 m wide. There were both clear-cuts and selective logging, all at least one year old. Circumstantial evidence suggests that higher primary productivities in the logged streams are mainly responsible for the changes in benthic populations, but that scouring by logging debris during winter floods may also be important. (Snyder-Calif Davis)
W79-00898

COMPUTER ANALYSIS OF THE WATER BUDGET OF THE PROPOSED OAK OPENINGS NEW TOWN, LUCAS COUNTY, OHIO,
Toledo Univ., OH.
M. B. McAvey.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 417, Price codes: A07 in paper copy, A01 in microfiche. Master's Thesis in Geology and Hydrogeology, March 1978. 133 p, 23 fig, 4 tab, 40 ref, 2 append. OWRT C-3082 (No 3682)(7).

Descriptors: *Hydrologic budget, *Water balance, Hydrology, *Computer models, Mapping, Discharge(Water), Land use, Drainage, Groundwater, Evapotranspiration, Evaporation, Runoff, Precipitation, Inflow, Dew point, Meteorology, Equations, Computer programs, Urbanization, Soil moisture, Water table, Surface-groundwater relationships, Surface discharge, Soil water movement, City planning, *Ohio.

The water budget for a proposed site of a new town near Toledo, Ohio, was calculated with the help of a computer assisted data analysis. Daily values of surface to groundwater outflows and groundwater storage were snythesized. Groundwater storage and material calculations were done using computer-drawn water table maps but with little success because of the large number of grid cells and relatively small number of observation points. A modified Weather Bureau equation using wind speed, temperature, dew point, and insolation data yielded estimates of daily lake evaporation and a preliminary estimate of evapotranspiration. The resulting annual total was 116% of precipitation. Seasonal adjustment factors which averaged 0.5 and reflected water availability were used to produce a balanced budget. A major component of the budget was atmospheric exchange which accounted for 59% of the output and all of the input. The only other significant term is surface outflow which is limited because of its controlling mechanism. Other factors are evapotranspiration and surface discharge resulting from groundwater flow to man-made drainage ditches. It is concluded that the area is poorly suited to urbanization and other extensive use because of the high risk of groundwater flooding in the spring and the need for large volumes of imported water in the fall. These problems result from the limited storage capacity of the reservoir, high soil conductivity, inadequate surface drainage, and high rate of evapotranspiration. (Majtenyi-IPA)
W79-00902

PHYSICAL AND ECONOMIC ASPECTS ASSOCIATED WITH RUNOFF FROM URBAN GROWTH IN THE RALSTON CREEK WATERSHEDS,
Iowa Univ., Iowa City.
J. R. Barnard, and T. E. Croley, II.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 390, Price codes: A04 in paper copy, A01 in microfiche. Final Report, September 1977. 55 p, 15 fig, 13 tab, 55 ref. OWRT A-053-IA(4) and OWRT B-0550IA(1).

Descriptors: *Model studies, *Watersheds(Basins), *Urban runoff, Iowa City, Flood forecasting, Data collection, Mathematical models, Water policy, Water management, Economic impact, Flood damage, Flood data, Flood frequency, Hydrologic models, Urbanization, Projections, Social aspects, Cost analysis, *Ralston Creek Watershed(Iowa).

The impact of urban expansion on the hydrology of the small Ralston Creek watershed area in Iowa City, Iowa, was evauated using modeling techniques requiring extensive precipitation and runoff records. A very effective hourly precipitation data generation model was constructed and the IIHR Stanford Watershed model was calibrated for pre-urban and present conditions to estimate surfacial flows and alternative future developpment. From the hydrologic model, backwater profiles and stage-discharge relations for selected points on the creek were translated into probability of flooding estimates. Evidence shows that as urban expansion spreads to upper portions of the watershed, the problem of flooding downstream increases. The effects of increased flood hazard on property values were examined and a survey of 61 households in the Ralston Creek was conducted. Aggregate social costs associated with urban expansion and flood hazard are estimated and policy implications are discussed. Primary questions to be answered are: (1) how can urban expansion proceed without increasing flood hazard; (2) what should be done about existing flood problems. (Majtenyi-IPA)
W79-00906

4D. Watershed Protection

KOLYMA WATER BALANCE STATION, MAGADAN OBLAST, NORTHEAST U.S.S.R.: UNITED STATES-SOVIET SCIENTIFIC EXCHANGE VISIT,
Forest Service (USDA), College, AK. Inst. of Northern Forestry.
C. W. Slaughter, and M. A. Bilello.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A041 616, Price codes: A02 in paper copy, A01 in microfiche. Special Report 77-15, Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire, May 1977. 71 p, 30 fig, 5 ref, 6 append.

Descriptors: Foreign research, *Alaska, *United States, *Research facilities, *Information exchange, *Hydrology, Water balance, Rivers, Watersheds(Basins), Permafrost, Snowpacks, Snow, Cold regions, Geological regions, Instrumentation, Equipmeant, Stream gages, Groundwater, Soil water, Precipitation(Atmospheric), *Exchange visits, *USSR, *Magadan Oblast(USSR), *Kolyma Water Balance Station(USSR).

Two US scientists visited Kolyma Water Balance Station (KWBS) in Magadan Oblast of northeast USSR during the last two weeks of August 1976. Under the auspices of the Joint US - USSR Agreement on Cooperation in the Field of Environmental Protection, this trip was undertaken to review current Soviet watershed hydrology research in a permafrost-dominated setting similar to that of central Alaska. Research objectives, instrumentation, and field practices were observed and discussed at KWBS. A series of proposals for future cooperation in high-latitude hydrology research and data exchange was prepared. (Sims-ISWS)
W79-00716

MANUAL FOR METHODS OF QUICKLY VEGETATING SOILS OF LOW PRODUCTIVITY, CONSTRUCTION ACTIVITIES,
Midwest Research Inst. Kansas City, MO.
F. W. Bennett, and R. L. Donahue.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 329, Price codes: A21 in paper copy, A01 in microfiche. Final Report, June 5, 1975. 484 p, 79 fig, 35 tab, 105 ref. EPA 68-01-2632.

Descriptors: *Sediment control, *Vegetation establishment, *Water pollution control, *Construction, Vegetation, Fertilization, Soils, Mulching, Runoff, Erosion, Water pollution, Environment, Erosion contol, Bank erosion, Rill erosion, Sheet erosion, Soil erosion, Soil management, Construction pollution control.

The study has produced a user's manual for the 50 states on latest methods and procedures for establishing dense stands of perennial vegetation on soils of low productivity that have been disturbed by construction activities, will hold the soil in place, and thus will minimize water pollution by sedimentation. The manual defined common ground, in a practical and applied way, among many technical disciplines. The sciences of soil, geologic material, and plant growth were defined and related. Emphasis of the manual was on vegetating soils that are naturally low in productivity. Soil Great Groups that fit this criteria representing 39% of the United States land area were discussed. The soil and plant research of many professional scientists was related and brought into focus. Demonstration sites at 10 locations were characterized and documented. (Sims-ISWS)
W79-00717

ECONOMIC ANALYSIS OF EROSION AND SEDIMENTATION, SEVEN MILE CREEK SOUTHWEST BRANCH WATERSHED,
Illinois Univ. at Urbana-Champaign. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6B.
W79-00791

DESERT TRANSFORMATION IN CHINA.
Academia Sinica, Taipei (Taiwan). Dept. of Desert Research.
For primary bibliographic entry see Field 4A.
W79-00798

A MOISTURE-ACCOUNTING WATERSHED MODEL FOR SINGLE-STORM EVENTS BASED ON TIME-AREA CONCEPT,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2A.
W79-00813

THE USE OF BENTHIC MACROINVERTEBRATES AS INDICATORS OF LOGGING IMPACT ON STREAMS WITH AN EVALUATION OF BUFFER STRIP EFFECTIVENESS,
California Univ., Berkeley. Dept. of Forestry and Conservation.
For primary bibliographic entry see Field 4C.
W79-00898

PHYSICAL AND ECONOMIC ASPECTS ASSOCIATED WITH RUNOFF FROM URBAN GROWTH IN THE RALSTON CREEK WATERSHEDS,
Iowa Univ., Iowa City.
For primary bibliographic entry see Field 4C.
W79-00906

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

COLORIMETRIC ANALYSIS OF AMMONIA IN WATER,
American Univ., Washington, DC. Dept. of Chemistry.
F. W. Carson, and R. L. Gross.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 301, Price codes: A02 in paper copy, A01 in microfiche. Washington Technical Institute Water Resources Research Center Report No. 11, February 1977. 8 p, 21 fig, 13 ref. OWRT A-003-DC(1).

Descriptors: *Ammonia, *Analytical techniques, *Colorimetry, *Chemical analysis, Chemical reactions, Analysis, Pollutants, Aqueous solutions, Water chemistry, Organic compounds, Measurement, Testing procedures, Automation.

An accurate, reliable method of determining concentration of ammonia in water solution was developed using colorimetric techniques. The procedure involves formation of a colored complex of ammonia with 2,5-dimethoxyoxolane and (E)-p-dimethylamino-cinnamaldehyde. This intensely blue complex has an alpha sub max of 630 nm and an extinction coefficient of 45,200 at a concentration of approximately 2 x 10(-5)M. The color forms in about 6 minutes and has a half-life of 7.8 hours. The procedure takes only about 3 minutes per analysis for multiple samples and involves a standard error of only 3%. Also, the method is suitable for automation. The lower limit of ammonia concentration is 10(-4)M but this could be reduced to 10(-6)M by increasing cell path to 10 cm and by using a spectrophotometer with an expanded scale of 0-0.1 absorbance units. (Majtenyi-IPA)
W79-00503

BIOLOGICAL CONTROL OF BLUE-GREEN ALGAE,
Nebraska Univ., Lincoln. School of Life Sciences.
E. L. Martin.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 311, Price codes: A03 in paper copy, A01 in microfiche. Nebraska Water Resources Research Institute Technical Completion Report, June 1976. 16 p, 11 fig, 7 tab. OWRT A-033-NEB(1).

Descriptors: *Cyanophyta, *Algal control, *Aquatic algae, *Lakes, *Algicides, *Eutrophication, Control, Water resources, Biological control, Recreation, Viruses, Plant viruses, Biocontrol, Microbiology, Nebraska, Scenery.

Three forms of blue-green algae, which detract from beauty and recreational value and accelerate eutrophication of many flood-control lakes in eastern Nebraska, have been isolated. Two filamentous forms, Aphanizomenon and Anabaena, and a unicellular Microcystis have been isolated in confluent, unialgal cultures; Microcystis has been isolated also in axenic culture. A search for naturally-occurring viruses and bacteria capable of selectively attacking these bloom-causing strains of algae has yielded several candidates. Two possible bacterial control agents were found and isolated in pure form. One was identified as a species from the genus Alcaligenes, and the other as a member of the Actinomycetes group. Studies on the mechanism of lysis indicate that the Actinomycetes appear to be able to express its lytic activity via an extracellular chemical but the Alcaligenes requires cell-to-cell contact with blue-green algal cells. A possible viral control agent has been isolated also and appears to be a new virus which was well characterized. This virus is specifically lytic to strains of Microcystis and Synechococcus. A second viral control agent was recently isolated but has not yet been well characterized. (Majtenyi-IPA)
W79-00509

NUTRIENT INPUTS AND ALGAL BLOOMS IN IOWA LAKES,
Iowa State Univ., Ames. Dept. of Animal Ecology.
For primary bibliographic entry see Field 5C.
W79-00510

SOILS AS A FACTOR IN THE FORMATION OF WATER CHEMICAL COMPOSITION AND BENTHIC COMMUNITIES IN SMALL RIVERS OF THE DESNA BASIN, (IN RUSSIAN),
Inst. Hydrobiol., Acad. Sci. Ukr. SSR Kiev, USSR.
For primary bibliographic entry see Field 2K.
W79-00520

EFFECTS OF ANTIMYCIN ON STREAM INSECTS,
Wisconsin Univ.-Madison. Dept. of Entomology.
For primary bibliographic entry see Field 5C.
W79-00525

PREDICTION OF HEAVY METAL UPTAKE BY MARSH PLANTS BASED ON CHEMICAL EXTRACTION OF HEAVY METALS FROM DREDGED MATERIAL,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5B.
W79-00548

A QUANTITATIVE STUDY OF THE PHYTOPLANKTON OF THE RIVER AVON, BRISTOL,
Ankara Univ. (Turkey). Dept. of Systematic Botany.
For primary bibliographic entry see Field 5C.
W79-00568

RUNOFF FROM FEEDLOTS AND MANURE STORAGES IN SOUTHERN ONTARIO,
Department of Agriculture, Ottawa (Ontario). Engineering Research Service.
For primary bibliographic entry see Field 5B.
W79-00570

NITRATE-NITROGEN IN EFFLUENT FROM AGRICULTURAL TILE DRAINS IN CALIFORNIA,
California Univ., Riverside. Dept. of Soil and Environmental Sciences.
For primary bibliographic entry see Field 5B.
W79-00574

DIFFERENCES IN PRODUCTIVITIES BETWEEN THE GREAT AUSTRALIAN BIGHT AND THE GULF OF CARPENTARIA, AUSTRALIA, IN SUMMER,
Hokkaido Univ., Hakodate (Japan). Faculty of Fisheries.
For primary bibliographic entry see Field 5C.
W79-00579

INFLUENCE OF METHODOLOGICAL FACTORS ON PLATE COUNTING OF AQUATIC BACTERIA: II. INCUBATION TIME (IN SPANISH),
Instituto Nacional de Limnologia, Santo Tome (Argentina).
F. Emiliani.
Rev Latinoam Microbiol 18(4), p 209-216, 1976.

Descriptors: Reviews, Analytical techniques, *Bacteria, *Pollutant identification, Incubation, *Water sampling.

After reviewing previous papers published on this theme from 1924-1974, the author demonstrates, through mathematical analysis, the importance of incubation time on plate counting.--Copyright 1978, Biological Abstracts, Inc.
W79-00580

EFFECT OF MACROPHYTES ON SOME HYDROCHEMICAL INDICES OF SHALLOW AREAS OF THE KREMENCHUG RESERVOIR (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
A. I. Merezhko, A. K. Ryabov, and G. V. Tsytsarin.
Gidrobiol Zh 13(3), p 111-115, 1977.

Descriptors: Aquatic plants, *Calcium ions, *Ions, Oxygen, Photosynthesis, *Bioindicators, Hydrogen, Pollutant identification, Water chemistry.

Data are presented on the effect of higher aquatic plants on the hydrochemical regime of shallow waters. A change in concentration of H ions in the medium was determined by photosynthesis activity in plants. A relationship was established between content of Ca ions and plant photosynthesis. A positive effect of plants on O2 conditions of shallow waters was observed.--Copyright 1978, Biological Abstracts, Inc.
W79-00606

THE QUALITY ASSURANCE PROGRAM OF A NATIONAL LABORATORIES SYSTEM,
Geological Survey, Albany, NY. Water Resources Div; and Geological Survey, Reston, VA. Water Resources Div; and Geological Survey, Lakewood, CO. Water Resources Div.
B. A. Malo, W. A. Beetem, L. C. Friedman, and D. E. Erdmann.
in: Proceedings of the 4th Joint Conference on Sensing of Environmental Pollutants, held in New Orleans, Louisiana, November 6-11, 1977: American Chemical Society, p 345-347, 1978. 4 ref.

Descriptors: *Water quality, *Quality control, *Chemical analysis, *Laboratory tests, *Analytical techniques, Laboratory equipment, Data collections, Reviews, Evaluation, Costs.

A 'Standard Reference Water Sample' study of the U.S. Geological Survey Water Resources Division has been conducted for over 14 years with more than 40 participating laboratories throughout the world. Means of concentration values and their standard deviations are calculated to evaluate the precision of the participating laboratories as a group. When the values for quality control data generated by the laboratories system during the last 3 years were compared to the Standard Reference Water Sample data, only 11 percent of the results exceeded 1.5 standard deviations from the accepted values compared to an expected 14 percent. During 1976, 9.2 percent of the values fell outside 1.5 standard deviations. (Woodard-USGS)
W79-00621

GLOBAL DISTRIBUTION OF CARBON DIOXIDE DISCHARGERS, AND MAJOR ZONES OF SEISMICITY,
Geological Survey, Reston, VA. Water Resources Div.; and Geological Survey, Reston, VA. Geologic Div.; and Geological Survey, El Paso, TX. Water Resources Div.
For primary bibliographic entry see Field 2K.
W79-00637

HYDROLOGIC RECONNAISSANCE OF TSALA APOPKA LAKE, CITRUS COUNTY, FLORIDA,
Geological Survey, Orlando, FL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W79-00639

ICHTHYOLOGICAL AND HYDROLOGICAL OBSERVATIONS AND STUDIES ON YARINA COCHA, NEAR PUCALLPA AND ON THE RIO PACAYA (CENTRAL AND LOWER UCAYALI, E PERU), (IN GERMAN),
Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn (West Germany).
For primary bibliographic entry see Field 5C.
W79-00668

OCCURRENCE, QUALITY, AND AVAILABILITY OF GROUND WATER IN JONES COUNTY, TEXAS,
Texas Dept. of Water Resources, Austin.
For primary bibliographic entry see Field 2F.
W79-00709

ANALYSES OF AROMATIC HYDROCARBONS IN INTERTIDAL SEDIMENTS RESULTING FROM TWO SPILLS OF NO. 2 FUEL OIL IN BUZZARDS BAY, MASSACHUSETTS,
Woods Hole Oceanographic Institution, MA. Dept. of Biology; and Woods Hole Oceanographic Institution, MA. Dept. of Chemistry.
J. M. Teal, K. Burns, and J. Farrington.
Journal of the Fisheries Research Board of Canada, Vol 35, No. 5, p 510-520, May 1978. 6 fig, 4 tab, 33 ref. From: Proceedins of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Sediments, *Intertidal areas, *Oil pollution, *Weathering, Aromatic compounds, Water pollution effects, Ecosystems, Oil spills, Massachusetts, *Outer Continental Shelf, Hydrocarbons, *Buzzards Bay(Mass).

The two- and three-ring aromatic hydrocarbons were analyzed from the Wild Harbor oil spill in September 1969 and the Winsor Cove oil spill in October 1974, in intertidal marsh sediments, using glass capillary gas-chromatographic and mass-fragmentographic analyses. Naphthalenes with 0-3 alkyl substitutions and phenanthrenes with 0-2 substitutions decreased in concentration with time in surface sediments. The more substituted aromatics decreased relatively less and in some cases actually increased in absolute concentration. The changes in composition of the aromatic fraction have potential consequences for the ecosystem and provide insight into geochemical processes of oil weathering. (Sinha-OEIS)
W79-00719

RESIDUES OF BUNKER C OIL IN CHEDABUCTO BAY, NOVA SCOTIA, 6 YEARS AFTER THE ARROW SPILL,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.
P. D. Keizer, T. P. Ahern, J. Dale, and J. H. Vandermeulen.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 528-535, May 1978. 7 fig, 1 tab, 21 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Oil spills, *Sediments, *Intertidal areas, Oil pollution, Environmental effects, Water pollution effects, *Outer Continental Shelf, Nova Scotia, Petroleum hydrocarbons, Aromatic hydrocarbons, Bunker C oil.

The Arrow spill in February 1970 heavily oiled approximately one half of the 600 km shoreline of Chedabucto Bay, Nova Scotia. An extensive field survey and chemical analysis of sediment samples for aliphatic and polycyclic aromatic hydrocarbons identified only a few locations where Arrow Bunker C remained in the intertidal and sublittoral sediments. The upper intertidal zones of Rabbit, Crichton, and Durell Islands remain covered with an oil and sediment mixture of a 'pavement-like' consistency. Several areas showed visual and chemical evidence of recent spills during the survey period. All sublittoral sediment samples contained hydrocarbons of petroleum origin. The distribution of the most highly contaminated sublittoral sediments suggests either reentry of stranded oil into the water column and into the sublittoral sediments or contamination from shipping and fishing vessels. Concentrations in the sublittoral sediments are below those found toxic to benthic organisms. An estimation of the amount of Bunker C remaining in Chedabucto Bay is impossible due to the patchy distribution, contributions of more recent spills, and the absence of adequate control sites. (Sinha-OEIS)
W79-00721

CONTRIBUTION OF CHRONIC PETROLEUM INPUTS TO NARRAGANSETT BAY AND RHODE ISLAND SOUND SEDIMENTS,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
E. S. Van Vleet, and J. G. Quinn.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 536-543, May 1978. 2 fig, 3 tab, 29 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Water pollution effects, *Sediments, *Oil pollution, Rhode Island, Environmental effects, *Outer Continental Shelf, Petroleum hydrocarbons, Biogenic hydrocarbons, Gulf of Maine.

Sediment cores from Narragansett Bay and Rhode Island Sound have been analyzed for petroleum hydrocarbons and compared with a relatively unpolluted sediment core from the Gulf of Maine. The sediments were analyzed for unbound hydrocarbons, hydrocarbons bound or closely associated with humic substances, and residual hydrocarbons bound or closely associated with the clay mineral or kerogen matrix. Results indicated that in general 90-100% of the hydrocarbons were in the unbound form and could be easily extracted with organic solvents. The petroleum hydrocarbons decreased with depth at all stations. Biogenic hydrocarbons made up an increasingly greater percentage of the total with increasing depth. The hydrocarbons in the Narragansett Bay sediments and near surface Rhode Island Sound sediments strongly resembled the hydrocarbons previously reported for the Providence River and upper Narragansett Bay. These petroleum-like hydrocarbons were shown to be largely introduced to the river and bay through chronic inputs from a municipal wastewater treatment plant. These hydrocarbons then undergo sedimentation throughout the entire bay and into Rhode Island Sound. Preliminary calculations indicate that over 0.2 million ton of petroleum hydrocarbons may be transported to the marine environment annually from municipal treatment plants. Most of these hydrocarbons appear to accumulate in estuarine and coastal sediments. (Sinha-OEIS)
W79-00722

PLANKTON COMMUNITY STRUCTURE: EVALUATION OF ANALYTICAL METHODS USING MODEL COMMUNITIES,
Georgia Univ., Athens. Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W79-00783

WILDERNESS WATER QUALITY: BISHOP CREEK BASELINE STUDY, 1974,
California Univ., Los Angeles. Environmental Science and Engineering.
For primary bibliographic entry see Field 5G.
W79-00859

SALMONELLOSIS IN MAN AND ANIMALS AS AN ENVIRONMENTAL HEALTH PROBLEM,
Purdue Univ., Lafayette, IN. Inst. of Environmental Health.
E. V. Morse, E. P. Myhrom, and D. E. Greenwood.
Journal Environment, Science and Health, A11(12), p 755-769, 1976, 1 tab, 67 ref. OWRT B-076-IND(2).

Descriptors: *Salmonella, *Water quality, Sewage bacteria, Water pollution, Water pollution sources, Public health, Human diseases, *Salmonellosis, *Food poisoning.

The Salmonella genus comprises over 1700 serotypes of pathogenic enteric bacteria. These microorganisms colonize in the intestinal tracts and mesenteric lymph nodes of man and lower vertebrates. Intra- and intergenus transfer of the infection(s) is cmmon. The disease in man and animals has not decreased during the last decade. Fecal contamination, by either symptomatic or occult carriers and shedders, is the primary transmission source of salmonellosis. The salmonellae problem and its possible resolution are intimately associated with the environment: waste disposal, including water and land use; food and feed processing, transportation and storage; livestock, poultry and dairy production; free-living and captive wildlife hosts as infection reservoirs; household pets and companion animals; various stress factors affecting man and food-producing animals; wholesale and retail marketing of fresh and frozen foods, and ultimately the consumer, including restaurants, involved in handling, preparation and storage of foods destined for the dinner table. Salmonellosis cannot be eradicated in the U.S. due to the environmental complexities of the problem. We can only hope for better preventive and control measures through greater effort in research, surveillance and education as well as awareness of the national problem.
W79-00865

SALMONELLA AS MONITORS OF FECAL POLLUTION IN THE AQUATIC ENVIRONMENT,
Purdue Univ., Lafayette, IN. Inst. of Environmental Health.
E. V. Morse, and M. A. Duncan.
Journal of Environment, Science and Health, A11 (10 and 11) p 591-601, 1976, 3 tab, 15 ref. OWRT-B-076-IND(1).

Descriptors: *Salmonella, *Sewage bacteria, *Water quality, Enteric bacteria, Water pollution, Mussels, Fish, Sediments, *Pollutant identification, Fecal pollution.

Polluted river water, river bottom sediment, fish body slime, fish gastrointestinal tracts and fresh water mussel gastrointestinal tracts were examined for Salmonella. Eleven serotypes were found among 131 isolates. S. amsterdam was the predominating Salmonella spp., and was obtained from all specimens. Two serotypes, give and senftenberg, were found only in the fish gastrointestional tracts. Salmonella may colonize in fish and serve as an indicator system for current as well as retrospective evidence of fecal pollution of the aquatic environment.
W79-00867

TRACE ELEMENT STUDY AT A PRIMARY COPPER SMELTER, VOLUME 1,
Radian Corp., Austin, TX.
K. Schwitzgebel, R. T. Coleman, R. V. Collins, R. M. Mann, and C. M. Thompson.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-285 935, Price codes: A05 in paper copy, A01 in microfiche. Report No EPA-600/2-78-065a, March 1978. 61 p, 15 fig, 21 tab. 68-01-4136.

Descriptors: *Air pollution, *Trace elements, *Toxicity, *Inustrial wastes, *Arsenic, *Electrostatic precipitation, Sampling, Evaluation, Molybdenum, Design standards, *Pollutant identification, Arsenic trioxide, Copper smelting.

A sampling study was carried out at a copper smelter, with a production rate of 200 tons of copper a day, with special emphasis on the performance of the electrostatic precipitator in collecting particulate matter escaping from the reverberatory furnace. Element balance of the reverberatory furnace showed that nearly all molybdenum is trapped in the slag; however, only 1/4 of the 190 lb/hr of arsenic entering the furnace is discharged with slag. About 1/4 of total arsenic is transported with the matte to the converters and about 1/2 leaves the furnace with the flue gas. Studies on the electrostatic precipitator led to the conclusion that particulate emissions are controlled with 96% efficiency at the 600 F operating temperature as specified in the design; however, appreciable amounts of toxic trace elements pass through the precipitator in the vapor state and condense to form particulate upon cooling. Arsenic trioxide was a major constituent of such vapor state emissions. (See also W79-00880) (Majtenyi-IPA)
W79-00879

TRACE ELEMENT STUDY AT A PRIMARY COPPER SMELTER, VOLUME 2, REPORT APPENDIX,
Radian Corp., Austin, TX.
K. Schwitzgebel, R. T. Coleman, R. V. Collins, R. M. Mann, and C. M. Thompson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-286 991, Price codes: A07 in paper copy, A01 in microfiche. Report No EPA-600/2-78-065b, March 1978. 131 p, 26 fig, 34 tab, 20 ref. 68-01-4136.

Descriptors: *Air pollution, *Trace elements, *Sampling, Analysis, *Industrial wastes, *Pollutant identification, X-ray fluorescence, Mass spectrometry, Arsenic, X-ray diffraction, Cadmium, Molybdenum, Lead, Antimony, Selenium, Zinc, Fluorine, Electrostatic precipitation, Copper smelting, Chemical analysis, Path of pollutants.

The details concerning sampling, sample analysis, and data evaluation are presented for a study made of trace element emissions of a primary copper smelter. During the evaluation of the electrostatic precipitor, the primary goal of the study, the parameters measured were: gas flow rate, gas composition, grain loading at inlet and outlet, particle size distribution, electrical performance, trace element material balance and flow rates as vapor, the amount of material condensible between gas temperature of 600 F and EPA recommended cool-off point of 250 F, and arsenic emission rates. Analytical procedures used to identify and quantify trace element emissions included x-ray fluorescence and spark source mass spectrometry. Results are tabulated for reverberatory furnace feed, impinger condensates, furnace slag, and incoming and outgoing electrostatic precipitator streams. Elements investigated include: arsenic, cadmium, molybdenum, lead, antimony, selenium, zinc, and fluorine. (See also W79-00879) (Majtenyi-IPA)
W79-00880

RELATIONSHIP BETWEEN CYTOPLASMIC DISTRIBUTION OF MERCURY AND TOXIC EFFECTS TO ZOOPLANKTON AND CHUM SALMON (ONCORHYNCHUS KETA) EXPOSED TO MERCURY IN A CONTROLLED ECOSYSTEM,
British Columbia Univ., Vancouver. Inst. of Oceanography.
For primary bibliographic entry see Field 5C.
W79-00892

THE USE OF BENTHIC MACROINVERTEBRATES AS INDICATORS OF LOGGING IMPACT ON STREAMS WITH AN EVALUATION OF BUFFER STRIP EFFECTIVENESS,
California Univ., Berkeley. Dept. of Forestry and Conservation.
For primary bibliographic entry see Field 4C.
W79-00898

A REPORT ON THE USE OF THE MACRORETICULAR RESIN XAD-2 TO ISOLATE PESTICIDES FROM THE CAPE FEAR RIVER,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
W. Harden.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 564, Price codes: A05 in paper copy, A01 in microfiche. Ms Thesis, 1977. 90 p. 17 fig, 25 tab. OWRT A-073-NC(3), 14-31-0001-5033.

Descriptors: *Pesticides, *Macroreticular resins, *Resins, *North Carolina, *Cape Fear River(NC), Isolation, *Pollutant identification, *Monitoring, Water quality, *Pesticide residues.

A procedure for the monitoring of pesticides in natural waters was developed and utilized in a survey of the Cape Fear River Basin of North Carolina. Pesticides were adsorbed from aqueous solution onto the macroreticular resin XAD-2 and subsequently eluted with diethyl ether. The eluate was concentrated and then analyzed by electron capture gas chromatography. Reproducible, though rather low, recovery efficiencies were obtained by this method. Concentrations in the ng/l range were found in Cape Fear River samples for several pesticides. Trifluralin, DDT, and DDE were identified in most samples. The concentrations of DDT and DDE exceeded recommended limits in Water Quality Criteria 1972 for protection of aquatic life. (Kiger-North Carolina)
W79-00901

TOXICITY OF PERCHLOROETHYLENE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE AND METHYLENE CHLORIDE TO FATHEAD MINNOWS,
Dow Chemical Co., Midland, MI. Environmental Sciences Research Lab.
H. C. Alexander, W. M. McCarty, and E. A. Bartlett.
Bulletin of Environmental Contamination and Toxicology, Vol. 20, p 344-352, 1978. 4 fig, 2 tab, 6 ref.

Descriptors: *Toxicity, *Bioassay, *Analytical techniques, *Minnows, Laboratory tests, Chemical properties, Mortality, Organic compounds, Gas chromatography, Water chemistry, Testing procedures, Evaluation, Fish behavior, *Toxicity testing, Static bioassay, Flow-through bioassay.

Static and flow-through fish toxicity tests were conducted on four chlorinated solvents: perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, and methylene chloride to demonstrate the significant difference between the static and flow-through toxicity values with highly volatile compounds. Flow-through tests provide information on toxic effects during continuous exposure of the organism to a constant concentration of a chemical while the static test provides one initial exposure of a nominal concentration. Oxygen is replenished, waste products removed, and fish are fed daily in the flow-through procedure. The static acute fish toxicity test is applicable when the compound is soluble in water and will remain in solution for a specified period of time. Because of the high volatility of the chlorinated solvents studied, the flow-through method was considered the appropriate test system. (EIS-Deal)
W79-00939

FIELD VERIFICATION OF CADMIUM TOXICITY TO LABORATORY DAPHNIA POPULATIONS,
Argonne National Labs, IL. Radiological and Environmental Research Div.
For primary bibliographic entry see Field 5C.
W79-00942

A PLANKTON NET DESIGNED TO EXCLUDE AIR-SEA INTERFACE PHENOMENA,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 7B.
W79-00943

SENSITIVITY OF COASTAL WATERS TO ANTHROPOGENIC TRACE METAL EMISSIONS,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
P. A. Yeats, J. M. Bewers, and A. Walton.
Marine Pollution Bulletin, Vol. 9, p 264-268, 1978. 2 tab, 30 ref.

Descriptors: *Metals, *Water quality, *St. Lawrence River, *Water chemistry, Water analysis, Canada, *Monitoring, Iron, Manganese, Cobalt, Nickel, Copper, Zinc, Cadmium, Chemical analysis, Industrial wastes, Chemical wastes, Municipal wastes, Baseline studies, Geochemistry.

Trace metal concentrations in the waters of the Gulf of St. Lawrence and the Scotian Shelf and their sensitivity to changes in the composition of the major contributor of freshwater, the St. Lawrence River, are assessed. Comparison of the levels of trace metals in eastern Canadian coastal waters with those of other coastal waters of the world reveals that the former area generally has lower trace metal concentrations and is, therefore, probably less contaminated than elsewhere. The increased anthropogenic activity in the St. Lawrence drainage basin required to increase the levesl of trace metals in receiving coastal waters by detectable amounts is discussed. We demonstrate that faster and more reliable warning of changes due to anthropogenic activity will be revealed through river monitoring than through monitoring of coastal waters. Changes in the marine environment can then be assessed through a thorough understanding of the geochemical behavior of trace metals in nearshore waters. (EIS-Deal)
W79-00946

A SIMULATION MODEL FOR LEAD MOVEMENT IN A WATERSHED,
Illinois Univ. at Urbana-Champaign. Inst. for Environmental Studies.
For primary bibliographic entry see Field 5B.
W79-00954

A TOXICOLOGICAL EVALUATION OF A PLASTIC OIL ABSORBANT,
Tromso Univ. (Norway). Inst. of Biology and Geology.
For primary bibliographic entry see Field 5C.
W79-00958

TOXICITY OF COPPER TO THREE ESTUARINE BIVALVES,
Centre of Advanced Study in Marine Biology Porot Novo (India).
For primary bibliographic entry see Field 5C.
W79-00974

ANALYTICAL REPORT NEW ORLEANS AREA WATER SUPPLY STUDY.
Environmental Protection Agency, Dallas, TX. Surveillance and Analysis Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 663, Price codes: A05 in paper copy, A01 in microfiche. Report EPA-906/9-75-003, 92 p, June 1975. 2 tab, 1 app.

Descriptors: *Water quality, *Domestic water, *Water purification, *Water analysis, Organic compounds, Public health, Gas chromatography, Spectroscopy, Chemical analysis, Chemical properties, Analytical techniques, Baseline studies, Chlorides, Water treatment, Aromatic compounds, Herbicides, Pesticides, *Aliphatic compounds.

Detailed descriptions of sampling and analytical methods used to identify and quantify trace organic compounds present in the finished (i.e. treated) water of the New Orleans, Louisiana area wate supply, specifically the Carrollton Water Plant (City of New Orleans), Jefferson Parish No. 1 Water Plant (Metairie) and the Jefferson Parish No. 2 Water Plant (Marrero). Organic compound identification and concentrations and methods of analysis of carbon and resin extracts are presented. (EIS-Deal)
W79-00981

SPECIES DIVERSITY AND RELATIVE ABUNDANCE OF BENTHIC MACRO-INVERTEBRATES OF CEDAR CREEK BASIN, KANSAS,
Kansas State Teachers Coll., Emporia. Dept. of Biology.
J. D. Ransom, and C. W. Prophet.
Am Midl Nat. 92(1), p 217-222, 1974.

Descriptors: Basins, Benthic fauna, Biomass, *Cedar Creek Basin(Kan), Chironomidae, Diversity, Dugesia, Ephemeroptera, *Invertebrates, *Kansas, Production, *Species diversity, Sphaeriidae, Trichoptera, Water quality, Streams, *Cottonwood River(Kan).

A spring and summer environmental inventory was made on the Cedar Creek Basin, Kansas, and an 18-km stretch of the Cottonwood River downstream from its confluence with Cedar Creek. Environmental qualities of the major streams in the basin were determined by species diversity indices and relative abundance of benthic fauna. A total of 105 taxa was collected. Diversity index (d) values for Cedar Creek and its 5 major tributaries were all above 3, indicating that these streams had excellent water quality. There was a significant difference (P = .05) between the Cedar Creek Basin streams and the Cottonwood River, where the d values were all less than 3. Only 56 taxa were collected from the Cottonwood River stations. With few exceptions, the benthic fauna at all stations was dominated by Trichoptera, Ephemeroptera, Elmidae, Chironomidae, Sphaeriidae and Dugesia. Caddis flies (Trichoptera) and fingernail clams (Sphaeriidae) were the most important members of the benthic fauna, constituting 50% or more of the total ash-free biomass at most stations.--Copyright 1974, Biological Abstracts, Inc.
W79-00991

5B. Sources Of Pollution

TECHNICAL AND REGULATORY STATUS OF THE PLACEMENT OF SANITARY LANDFILLS IN IOWA,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 5E.
W79-00502

FLUORIDE ACCUMULATION IN THE TERRESTRIAL AND AQUATIC COMPONENTS OF THE DOUGLAS CREEK DRAINAGE OF WESTERN MONTANA,
Montana Univ., Missoula. Environmental Studies Lab.
For primary bibliographic entry see Field 5C.
W79-00504

THE DALY POISONING OF MODERN MAN (IN ITALIAN),
Acad. Gioenia Sci. Nat., Catania, Italy.
For primary bibliographic entry see Field 5C.
W79-00519

STATISTICAL AND STOCHASTIC ANALYSES OF SYNTHETICALLY GENERATED URBAN STORM DRAINAGE QUANTITY AND QUALITY DATA,
Purdue Univ., Lafayette, IN. Water Resources Research Center.
For primary bibliographic entry see Field 6A.
W79-00521

PRODUCTIVITY OF OEDOGONIUM IN LAKE WINGRA, WISCONSIN,
Texas Christian Univ., Fort Worth. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W79-00522

DEVELOPMENT OF COMPUTER PROGRAM FOR LINEARIZED SUBHYDROGRAPHS METHOD FOR URBAN RUNOFF DETERMINATION,
Akron Univ., OH. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W79-00526

POLLUTION IN RUNOFF FROM NONPOINT SOURCES,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
K. L. Campbell.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 279, Price codes: A04 in paper copy, A01 in microfiche. University of Florida Water Resources Research Center Publication No. 42, 1978. 49 p, 10 fig, 21 tab, 32 ref. OWRT B-023-FLA(1), 14-31-0001-5064.

Descriptors: *Nutrients, Water quality, *Nonpoint pollution, Mathematical models, Path of pollutants, Water pollution sources, *Nitrogen, *Phosphorus, *Fertilizers, *Agricultural runoff.

The increasing concern for the quality of our environment demonstrates the importance of gaining an increased understanding of the mechanisms and processes involved in nutrient movement from diffuse sources. In this study, nitrogen and phosphorus loads were determined for two agricultural watersheds: one primarily in native forest cover and the other primarily in intensive crop production. Small plots were used to evaluate the effects of selected cultural and water management practices on nitrogen and phosphorus loads in surface runoff from sandy soils. In both locations, nitrogen and phosphorus losses in runoff were very small compared with amounts received by the land area in precipitation and commercial fertilizer. Techniques were developed to simulate nitrogen movement through agricultural watersheds. Simulation models are an effective tool to assist in gaining a better understanding of the complex processes and interactions that occur in a watershed system. They can help in identifying which processes are most important in controlling nitrogen movement within a watershed. (Morgan-Florida)
W79-00527

EFFECTS OF SOIL INJECTION OF LIQUID DAIRY MANURE ON THE QUALITY OF SURFACE RUNOFF,
Kentucky Water Resources Research Inst., Lexington.
I. J. Ross, S. Sizemore, J. P. Bowden, and C. T. Haan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 278, Price codes: A05 in paper copy, A01 in microfiche. Research Report No. 113, 1978. 73 p, 43 fig, 1 tab, 1 ref. OWRT B-047-KY(1), 14-34-0001-6082.

Descriptors: Soil contamination, Soil management, *Soil moisture, *Soil treatment, Soil water, Soil water management, Soil water movement, *Farm wastes, *Injection, *Path of pollutants.

Liquid dairy manure has been injected on the soil contour to depths of 6 and 12 inches and applied to the surface of a Bluegrass sod and a bare tilled soil. Application rates of 9.250 gallons per acre were used. Runoff from 9-foot-square plots which were sprinkled at rates of 2.5 inches per hour on sod and 1.5 inches per hour on bare soil was collected and analyzed for various pollution parameters including COD, N, TSS, pH, DO, and fecal coliform. The effects of pollutant yield in the runoff have been determined for various treatments. Injection of the manure into the soil essentially eliminated any pollutant yield in the runoff from the test plots as compared with surface application. Also, injection tended to even the rate of pollutant loss in the runoff. Increasing the delay-time between application of liquid manure and the simulated rainfall event significantly decreased the yield of pollutants in the runoff. Repeated yearly applications of manure on sod reduced pollutant concentration in runoff and also reduced runoff rates. Test results indicate that pollutant concentration in runoff is a function of the concentration in the liquid manure and the total quality of runoff. (Huffsey-Kentucky)
W79-00528

INFLUENCE OF WATER AND FERTILIZER MANAGEMENT ON YIELD AND WATER-INPUT EFFICIENCY OF CORN,
Florida Univ., Quincy.
F. M. Rhoads, R. S. Mansell, and L. C. Hammond.
Agronomy Journal, Vol. 70, p 305-308, March-April, 1978. 2 fig, 4 tab, 9 ref. OWRT A-026-FLA(13), 14-34-0001-6010.

Descriptors: *Corn(Field), Infiltration, Trickle irrigation, *Herbicides, *Fertilizers, Soils, Kinetics, Herbicide sorption(Soils), Soil pH, Fertilization, Nutrient uptake, Soil water movement.

Damaging plant water stress develops in corn grown on coarse-textured, low water retaining soils of the southeastern U.S. during 1 to 2-week periods without rainfall. However, in most years rainstorms cause leaching of soluble fertilizers from the root zone. This study was conducted to evaluate efficiency of water input in terms of corn grain yield per unit of water, with two fertilizer application methods under three soil-water management systems on a Troup loamy sand (Grossarenic Paleudult). Water management consisted of (1) control - natural rainfall only, (2) trickle irrigation scheduled daily (0.64 cm/day), and (3) trickle irrigation scheduled by tensiometer (1.30 cm/application). Tensiometers were placed in each treatment at six depths between 15 and 150 cm below the soil surface and readings were recorded daily. Methods of applying fertilizers were designated (1) conventional - 1/3 of N and all P and K applied broadcast preplant, and remainder of N applied in two side-dressings; (2) program fertilization - N-P-K applied broadcast in small increments (5, 5, 10, 20, 20, 20 and 20%) at 2-week intervals after corn emerged. Average grain yields for the above water management treatments were 2,790, 4,160, and 5,700 kg/ha respectively. Conventional fertilization had an average grain yield of 3,680 kg/ha and program fertilization 4,760 kg/ha.

Water-input efficiencies based on grain yields and total water input were 57, 42, and 76 kg/ha/cm for no irrigation, daily irrigation, and tensiometer scheduled irrigation respectively. (Morgan-Florida)
W79-00530

MINERAL CYCLING IN SALT MARSH-ESTUARINE ECOSYSTEMS; ECOSYSTEM STRUCTURE, FUNCTION, AND GENERAL COMPARTMENTAL MODEL DESCRIBING MINERAL CYCLES,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5C.
W79-00539

GEORGETOWN HARBOR, SOUTH CAROLINA; REPORT 1, HYDRAULIC SALINITY, AND SHOALING VERIFICATION; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W79-00540

PREDICTION OF HEAVY METAL UPTAKE BY MARSH PLANTS BASED ON CHEMICAL EXTRACTION OF HEAVY METALS FROM DREDGED MATERIAL,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
C. R. Lee, R. M. Smart, T. C. Sturgis, R. N. Gordon, Sr., and M. C. Landin.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A054 129, Price codes: A02 in paper copy, A01 in microfiche. Technical Report D-78-6, February 1978. 107 p, 18 tab, 14 fig, 48 ref, 2 append.

Descriptors: Zinc, Copper, Cadmium, Lead, *Heavy metals, *Marsh plants, Sampling, Waste disposal, *Dredged material, Plant populations, DTPA extraction, Absorption, Chromium, Nickel, Mercury.

Extensive field sampling of marsh plants and dredged material from U.S. Army Corps of Engineers disposal sites was conducted along the East and Gulf Coasts of the United States. Marsh plant species studies included Spartina alterniflora, Spartina patens, and Distichlis spicata. Four procedures for the extraction of heavy metals from soil were evaluated including water soluble, ammonium acetate exchangeable, dilute acid extractable, and DTPA extractable. Results indicated that most marsh plants colonizing dredged material disposal sites sampled in this study contained relatively low concentrations of Zn, Cu, Cd, Pb, Cr, Ni, and Hg. These concentrations were very similar to those reported for natural coastal marshes. In a few locations, however, the concentrations of Zn, Cu, Cd, and Pb in the marsh plants were an order of magnitude greater than the concentrations measured in the majority of marsh plants. DTPA extraction of heavy metals gave the best correlations with actual heavy metal concentrations in marsh plants. Marsh plant uptake of Zn, Cu, Cd, and, to some extent, Pb and Cr from dredged material can be predicted using a DTPA extraction procedure. (WES)
W79-00548

RUNOFF FROM FEEDLOTS AND MANURE STORAGES IN SOUTHERN ONTARIO,
Department of Agriculture, Ottawa (Ontario). Engineering Research Service.
D. R. Coote, and F. R. Hore.
Canadian Agricultural Engineering, Vol. 19, No. 2, December 1977, p 116-121. 6 tab, 21 ref.

Descriptors: *Feedlots, *Agricultural runoff, *Manure storage, *Suspended solids, *Water pollution sources, *Ontario, *Canada, Paving, Nutrients, Equations, Regression analysis, Cattle, Seasonal, Precipitation(Atmospheric), Forecasting, Agriculture.

Suspended solids was the most critical water quality parameter found during monitoring of quantity and quality of runoff from paved and unpaved cattle feedlots and paved solid and semi-solid manure storages in southern Ontario, Canada in 1973-75. Suspended solids concentration was significantly related to total solids; biochemical oxygen demand; total Kjeldahl, ammonia, nitrate, and nitrite nitrogen total phosphorus; and orthophosphate phosphorus. A procedure was developed for predicting runoff quantities from individual runoff events using regression equations of runoff on precipitations. A prediction procedure is also presented for water quality parameters. Runoff values (as percentages of precipitation after commencement of runoff) were lower for the feedlots studied than for similar sites in the midwestern U.S. Runoff water quality was more variable and less predictable than quantity, and no runoff was of acceptable quality for direct discharge to receiving waters. Statistically significant differences were found among the four sites monitored and between summer and winter runoff for most water quality parameters. Runoff volumes and water quality concentrations were combined to estimate nutrient losses from each site on a per-animal unit basis. Results can be used in volumetric design of runoff detention structures, and as a nutrient loadings guide for crop production systems incorporating land application of runoff. (Lynch Wisconsin)
W79-00570

CHANGES IN CARBON AND NITROGEN CONTENT DURING DECOMPOSITION OF THREE MACROPHYTES IN FRESHWATER AND MARINE ENVIRONMENTS,
Oakland Univ., Rochester, MI. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W79-00571

EFFECT OF THE CONCENTRATION OF NITROGEN COMPOUNDS ON MICROBIAL REDUCTION OF SULPHATES,
Adam Mickiewicz Univ., Poznan (Poland). Inst. of Chemistry.
For primary bibliographic entry see Field 5C.
W79-00572

NITRATE-NITROGEN IN EFFLUENT FROM AGRICULTURAL TILE DRAINS IN CALIFORNIA,
California Univ., Riverside. Dept. of Soil and Environmental Sciences.
J. Letey, J. W. Blair, D. Devitt, L. J. Lund, and P. Nash.
HILGARDIA, Vol 45, No 9, December 1977, p 289-319. 12 fig, 8 tab. NSF-RANN GI-34733X.

Descriptors: *Nitrates, *Nitrogen, *California, *Tile drainage, *Agricultural runoff, *Effluents, Water pollution sources, Nutrients, Fertilizers, Agriculture, Irrigation, Drainage, Soil types, Basins, Small watersheds.

Quantity and concentration of nitrate-nitrogen in tile drainage and its relationship to soil, crop, fertilizer inputs, and water application timing were determined for several California valleys. Tile drainage effluents were monitored at 55 sites on farms in the Imperial, Coachella, Ventura-Oxnard, San Joaquin, and Salinas Valleys. Questionnaires and personal interviews were used to obtain local information on land use, fertilizer applications, and irrigation. It was concluded that: (1) Nitrate-nitrogen concentrations in the tile effluent were not well-correlated with fertilizer application rate, effluent volume, or soil profile properties. (2) Amount of nitrate-nitrogen lost through tile effluent was well-correlated with total water discharge, fertilizer application, and soil profile characteristics; lowest amounts were associated with soil profiles having layers of clay or silty clay; the best correlation was between amount of tile effluent volume. (3) Alluvial soils in the western San Joaquin Valley contained significant native nitrogen, contributing both to high nitrate-nitrogen concentrations and total mass emissions in tile effluent. (4) Low nitrate-nitrogen concentrations and mass emissions occurred where alfalfa was the crop and no nitrogen fertilizer was used. (5) Soils with clay or silly clay layers had lower total nitrate-nitrogen emission, while highest losses were on sandy profiles receiving relatively high quantities of nitrogen fertilizer. (Lynch-Wisconsin)
W79-00574

PARTICULARATE ORGANIC MATTER IN SURFACE WATERS OFF SOUTHERN CALIFORNIA AND ITS RELATIONSHIP TO PHYTOPLANKTON,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 5C.
W79-00581

CHANGES IN THE CHARACTER OF MEADOW PLANT COMMUNITIES INDUCED BY THE OVERFLOW AND STAGNATION OF SALT WATER, (IN POLISH),
Polish Academy of Sciences, Krawkow. Inst. Uprawy Roli Roslin.
Fragm Florist Geobot (Cracow), 23 (1), p 68-76, 1977.

Descriptors: Agropyron-Repens, Atriplex-Hastatum, Var-Salinum, Calcium, Chlorides, Halophytes, *Poland, Potassium, Puccinellia-distans, Salts, Sodium, Soils, Spergularia-saina, Water pollution, *Salinity, *Saline water, *Salt mines, *Plant physiology, Plant growth.

The overflow and stagnation of salt waters coming from the Wieliczka (Poland) salt mine induced changes in the character of plant communities. Where saline waters stagnated longest the vegetation of meadows underwent total destruction, and artificial salt flat arose with soil of a high Na, Ci, Ca content. On the other hand, in the places over which salt waters ony flowed or impregnated the soil much smaller changes occurred in the chemical compostion of the soil and in the specific composition of the meadow plant communities. The areas most impregnated with salt were gradually dominated by such halokphilous species as Spergularia salina, Atriplex hastatum var. Salinum and Puccinellia distans. In places in which the influence of salt waters was of short duration, the percentage of haophytes in the meadow plant communities was much smaller and the predominat plants were of the alliance agropyro Rumicion Crispi with Agropyron repens as the dominat species. In the areas bordering the limit of salt waters the species typical of meadow communities survived, and the portion of nitrophilous plants amount them was only slightly greater. In unsodded places there appeared single specimens of p. distans. The latter plant occurred in all areas but varied in number, its quantity corresponding to the degree of soil salinity.- coyright 178, Biological Abstracts, Inc.
W79-00610

THE OTHER WATER POLLUTION (NONPOINT SOURCE POLLUTION),
K. Barton.
Environment, Vol. 20, No. 5, p 12-20, June, 1978. 1 tab.

Descriptors: *Water pollution sources, *Sediments, *Urban runoff, *Federal water pollution control act, Water pollution control, Pollutant identification, Agricultural runoff, Mining, Construction, Septic tanks, Landfills, Groundwater movement.

The 1972 Federal Water Pollution Control Act (FWPCA) requires control of nonpoint as well as point sources of water pollution. Nonpoint source pollution consists of all water pollution that is not released at one specific identifiable point. Approximately 50 percent of the nation's water pollution is estimated to be from nonpoint sources. The federal water pollution control program under the FWPCA has proven to be seriously inadequate in the nonpoint area. Nonpoint source pollution consists primarily of runoff. The Federal Environmental Protection Agency (EPA) groups nonpoint pollution sources into eight categories: (1) silviculture; (2) agriculture; (3) mining; (4) road and building construction; (5) saltwater intrusion; (6) subsurface excavations; (7) hydrologic modification; and (8) urban runoff. The major pollutant from nonpoint sources is sediment; agriculture runoff is its main source. Urban runoff is said to be as serious a problem as agriculture in many areas. Best management practices is the term used by the EPA for the various methods for reducing nonpoint pollution. The methods of control are as varied as the sources and several methods are examined. The article explores the theory behind the Clean Air Act and how it has been put into practice. (Quarles-Florida)
W79-00614

POTENTIAL EFFECTS OF DEEP-WELL WASTE DISPOSAL IN WESTERN NEW YORK,
Geological Survey, Albany, NY. Water Resources Div.
R. M. Waller, J. T. Turk, and R. J. Dingman.
Available from Supt. of Documents, GPO Washington, DC 20402, Price $1.90. Professional Paper 1053, 1978. 39 p, 18 fig, 5 tab, 36 ref.

Descriptors: *Model studies, *Underground waste disposal, *Injection wells, *Geochemistry, *Chemical reactions, Acids, Iron compounds, Hydrogeology, Aquifer characteristics, Hydraulic properties, Pressure head, Laboratory tests, On-site tests, Hydrofracturing, *Waste pickling liquor, *Steel industry, Western New York.

Mathematical and laboratory models were used to observe, respectively, the hydraulic and chemical reactions that may take place during proposed injection of a highly acidic, iron-rich waste pickle liquor into a deep waste-disposal well in western New York. Field temperature and pressure conditions were simulated in the tests. Hydraulic pressure in the middle stages of the initial (1968) injection test had probably hydraulically fractured the Cambrian sandstone-dolomite formation adjacent to the borehole. Transmissivity of the formation is 13 feet squared per day. The proposed rate of injection (72,000 gallons per day) of waste pickle liquor would approach a wellhead pressure of 600 pounds per square inch in about a year. Hydraulic fracturing would reoccur at about 580 pounds per square inch. The measurable cone of influence would extend about 22 miles after injection for 1 year. Chemical reactions between acidic wastes and brine-saturated dolomite would create precipitates that would drastically reduce the permeability of the unfractured part of the dolomite. Nondolomitic sandstone permeability would not be affected by chemical reactions, but the pores might be plugged by the iron-bearing waste. The digital model can be used for qualitative predictions on a regional scale. (Woodard-USGS)
W79-00625

NUMERICAL SIMULATION OF DISSOLVED SILICA IN THE SAN FRANCISCO BAY,
Geological Survey, Menlo Park, CA. Water Resources Div.; and National Oceanographic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorologica Labs.
For primary bibliographic entry see Field 2L.
W79-00635

PROCEEDINGS OF THE FIRST US/USSR SYMPOSIUM ON COMPREHENSIVE ANALYSIS OF THE ENVIRONMENT.
Environmental Protection Agency, Washington, DC. Office of Research and Development.
For primary bibliographic entry see Field 6G.
W79-00654

A COMPUTER MODEL OF THE POPULATION OF CHIRONOMIDS (IN RUSSIAN),
Akademiya Nauk Latviiskoi SSR, Riga. Inst. of Biology.
G. V. Titarenko.
Zool Zh 56(4), p 530-537, 1977.

Descriptors: Biomass, *Chironomus-plumosus, *Computer models, *Energy flow, Food, *Mathematical models, Predation, Production, Weight, *Model studies, Distribution.

A mathematical model was constructed to represent the energy flow through a hypothetical population of Chironomus plumosus L. The model describes the state of the population as a numerical distribution of individual weights for every 5 days during the year. The weight growth rate depends on interspecific competition. Some characteristics of production dynamics as function s of the amount of food and the given: pressure of predators are biomass (B) production (P) and P/B. The model was produced on the computer.--Copyright 1978, Biological Abstracts, Inc.
W79-00659

EFFECTS OF A COASTAL FRONT ON THE DISTRIBUTION OF CHLOROPHYLL IN LAKE TAHOE, CALIFORNIA-NEVADA,
California Univ., Davis. Div. of Environmental Studies.
M. R. Leigh-Abbott, J. A. Coil, T. M. Powell, and P. J. Richerson.
Journal of Geophysical Research, Vol 83, No C9, p 4668-4672, September 20, 1978. 8 fig, 13 ref. NSF DEB76-20341.

Descriptors: *Lakes, *California, *Nevada, *Chlorophyll, *Water temperature, On-site investigations, Sampling, Temperature, Winds, Data processing, Fluorescence, Coasts, Shores, Topography, Lake morphology, Limnology, *Lake Tahoe, Water fronts.

The existence of a distinct coastal zone was confirmed in Lake Tahoe (California-Nevada) by horizontal transects measuring chlorophyll and temperature simultaneously. Creation of the coastal region is influenced by bottom topography, the nature of the surface wind stress, and the difference between physical processes occurring within a Rossby radius of deformation and those occurring in midlake. Chlorophyll records from horizontal transects were decomposed by spectral analysis, and the normalized sectra from nearshore and midlake were compared. The two regions were found to differ at large scales, primarily because of differences in nutrient import, and at intermediate scales because of differences in the mixing regime. The coastal zone was observed to erode with increasing winds and weakening stratification, leading to little significant difference between nearshore and midlake chlorophyll patterns. (Sims-ISWS)
W79-00699

DISSIPATION OF HEAT FROM COOLING PONDS,
Bhabha Atomic Research Centre, Bombay (India).
R. S. D'Souza, and T. P. Sarma.
Indian Journal of Meteorology, Hydrology, and Geophysics, Vol. 28, No. 4, p 459-464, October 1977. 4 fig, 2 tab, 12 ref.

Descriptors: *Cooling water, *Ponds, *Heated water, *Model studies, Mathematical models, Temperature, Air temperature, Water temperature, Winds, Humidity, Heat, Heat flow, Heat transfer, Dispersion, Energy dissipation, Powerplants, Nuclear powerplants, *India, Heat dissipation, Cooling ponds.

A mathematical model was proposed for the planning of cooling ponds used for dissipation of waste heat from heated discharge waters of power generating stations. This dissipation of waste heat was found to be mainly dependent on wind speed and water temperature, was influenced negligibly by air temperature and humidity, and was independent of solar radiation. The model's special application is where the water resources are limited and recycling of water used for cooling the condenser waters of the power station is necessary. The models showed that the acreage requirements of the cooling ponds of such types of the order of 1.0 to 2.5 acres/Mw (e) during the hotter months at Bombay. Data were collected also at Tarapur Atomic Power Station's discharge channel, and the model calculations compared well with the actual temperature fall in the channel observed during low tide. (Sims-ISWS)
W79-00702

LONG-TERM FATE OF A HEAVY FUEL OIL IN A SPILL-CONTAMINATED B.C. COASTAL BAY,
Institute of Ocean Sciences, Sidney (British Columbia).
For primary bibliographic entry see Field 5C.
W79-00720

MEASURES AGAINST STORM WATER POLLUTION, (IN SWEDISH),
Chalmers Univ. of Technology, Goteborg (Sweden). Vatten Inst. Tek.
For primary bibliographic entry see Field 5G.
W79-00726

CHARACTERIZATION OF CONFINED DISPOSAL AREA INFLUENT AND EFFLUENT PARTICULATE AND PETROLEUM FRACTIONS,
University of Southern California, Los Angeles. Environmental Engineering Program.
J. C. S. Lu, Eichenberger, B. Kenezevic, and K. Y. Chen Miroslav.
Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-78-16, May 1978. 178 p, 8 tab, 29 fig, 19 ref, 3 append.

Descriptors: *Effluents, *Sedimentation, *Water quality, *Oil pollution, Influents, *Dredged material disposal, Dredged material, *Waste disposal sites, *Trace metals, Particulates.

Analyzes contaminants in influents and effluents from confined dredged material disposal areas at Pinto Island, Mobile Bay, Alabama, and Grassy Island, Detroit, Michigan. Samples were separated into 0.05-u, 0.45-u, and 8.0-u fractions. The total sample and filtrate were analyzed for metals, nutrients, total carbon, organic carbon, chlorinated hydrocarbons, oil ad grease, sulfide, and solids contents. Results show that, in general, the removal efficiency of total trace metals was similar to the total solids removal. These results agree with the analytical data which show that approximately 99% of the total trace metals was associated with the solid settleable phase (> 8-u). The total trace metal concentrations in the effluents at both disposal sites were significantly greater than the marine water quality requirements. Therefore, confined disposal operations will require either long detention times or treatment in order to meet applicable water quality standards. On the other hand, it may be necessary to amend appropriate water quality criteria to differentiate the ecological significance of soluble and particulate fractions so that meaningful water quality criteria can be established.
W79-00763

PREDICTING PESTICIDE RUNOFF FROM AGRICULTURAL LAND: A CONCEPTUAL MODEL,
Southeast Environmental Research Lab., Athens, GA.
G. W. Bailey, R. R. Swank, Jr., and H. P. Nicholson.
J Environ Qual. 3(2), p 95-102, 1974.

Descriptors: *Agricultural runoff, Land use, Microorganisms, *Model studies, *Pesticides, Rainfall, Soil, Water pollution sources, *Forecasting, *Pesticide residues, Path of pollutants.

A mathematical model of the dynamic, single-rainfall-event type is being developed to describe quantitatively pesticide runoff as a function of pesticide and soil properties, agricultural practices watershed characteristics and climatic factors. From the model, guidelines governing pesticide use will be derived to prevent or minimize water pollution resulting from runoff from agricultural land. The model described is based on a state-of-the-art approach. Pesticide transport is 'piggybacked' on existing hydrologic and soil-loss models. Both direct mass-balance and area 1 averaging-statistical simulation approaches are being considered for the basic runoff and sediment transport descriptors. The conceptual structure of the overall model includes: source term effects (parameters that determine the initial concentration of pesticide available for runoff) e.g., pesticide formulation, physical-chemical properties and initial spatial distribution; loss of pesticide from the surface zone between rainfall events by various attenuation processes (volatilization, microbial, chemical, and photochemical degradation, and organism uptake); and loss of pesticide from the soil surface during runoff-producing rainfall events because of mass transfer from soil surface into the moving runoff film and pickup of sediment containing pesticide particulates. The minimum output requirements for the model are the prediction of runoff rate and sediment loading plus the corresponding water and sediment phase pesticide concentrations at a designated boundary (normally a watershed confluence or drainage channel) as a function of time during a runoff event. This output is to be based upon input consisting of the type, formulation, and rate and method of application of the pesticide, and the areal extent, topography, type of soil, cropping characteristic and rainfall characteristic of the watershed or basin. The model will internally generate and store the appropriate boundary condition changes required to predict sequential rainfall response using between-event meteorological data as input.--Copyright 1974, Biological Abstracts, Inc.
W79-00796

AN EXPERIMENTAL STUDY OF FLOW AND OXYGEN TRANSFER IN CIRCULATION INDUCED BY AIR BUBBLE PLUMES,
New Hampshire Univ., Durham. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 2E.
W79-00856

THE ADSORPTION-DESORPTION OF DIURON BY FRESHWATER SEDIMENTS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
D. E. Park.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 411, Price codes: A04 in paper copy, A01 in microfiche. Master of Science Thesis, June, 1977, 48 p, 9 fig, 14 tab, 28 ref. (California Water Resources Center Project UCAL-WRC-W-485).

Descriptors: *Adsorption, *Desorption, Soil sciences, Pesticides, *Diuron, *Sediments, California, Organic carbon, Freundlich equation.

Freshwater sediments were collected from 8 locations in California to study their adsorption and desorption of diuron. The sediments were characterized as to physical and chemical properties using the same methods used for soils. The sediments have a range of organic carbon of .91 - 19% and are high in silt and clay. The organic carbon was correlated with CEC of organic matter and inversely correlated to pH and clay content. Most of the sediments had a C:N ratio equal to that of soils. The adsorption of diuron could be described by the Freundlich equation. Adsorption expressed as the Freundlich coefficient k, was correlated to the amount of organic carbon present. As the organic carbon increased, adsorption of diuron increased. There was no correlation with total CEC. The desorption of diuron was evaluated by taking the difference between the slope of the adsorption and desorption isotherms. These differences were positively correlated to k and organic carbon. As the difference between these slopes increased, the less diuron desorbed. Finally, adsorption was determined at two additional temperatures of 5C and 40C on 3 sediments. As the temperature increased, the adsorption of diuron decreased. (Snyder-Calif, Davis)
W79-00860

MATHEMATICAL MODEL FOR MULTIPLE COOLING TOWER PLUMES,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Hydraulics and Water Resources.
F. H. Y. Wu, and R. C. Y. Koh.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-286 364, Price codes: A07 in paper copy, A01 in microfiche. Report No EPA-600/7-78-102, June 1978. 134 p, 25 fig, 34 ref, 3 append. EPA (5) R-803989-01-1.

Descriptors: *Path of pollutants, *Mathematical models, *Cooling towers, *Plumes, *Model studies, Environmental effects, Air pollution, Moisture, Humidity, Laboratory tests, Forecasting, Simulation, Hydraulic models, Estimating, Computer models, Liquid phase moisture, *Thermal pollution, Heat transfer, Temperature.

A mathematical model was developed for predicting properties of moist plumes emitted from cooling towers as a means of assessing environmental impact of these systems. The properties investigated include: excess plume temperature, humidity and liquid phase moisture (water droplet), plume trajectory, width, and dilution at the merging locations, and the beginning and ending points of the visible part of the plumes. Based on comparison with laboratory data, this model gives good predictions for the case of dry plumes where no moisture is involved; however, several empirical coefficients are not yet known accurately. Verification of this model for wet plumes, such as the prototype cooling tower plumes, and determination of the values for these empirical coefficients to be used in prototype applications must await detailed comparison with field data. (Majtenyi-IPA)
W79-00876

TRACE ELEMENT STUDY AT A PRIMARY COPPER SMELTER, VOLUME 1,
Radian Corp., Austin, TX.
For primary bibliographic entry see Field 5A.
W79-00879

TRACE ELEMENT STUDY AT A PRIMARY COPPER SMELTER, VOLUME 2, REPORT APPENDIX,
Radian Corp., Austin, TX.
For primary bibliographic entry see Field 5A.
W79-00880

LABORATORY AND FIELD MEASUREMENTS OF UPWELLED RADIANCE AND REFLECTANCE SPECTRA OF SUSPENDED JAMES RIVER SEDIMENTS NEAR HOPEWELL, VIRGINIA,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
C. H. Whitlock, W. G. Witte, E. A. Gurganus, and J. W. Usry.
Available from the National Technical Information Service, Springfield, VA 22161 as NASA TP-1292, Price codes: A03 in paper copy, A01 in microfiche. Report No NASA TP-1292, October 1978. 27 p, 10 fig, 3 tab, 6 ref, 1 append.

Descriptors: *Sediments, *Reflectance, *James River, *Suspended solids, Turbidity, Laboratory tests, Optical properties, On-site data collections, Model studies, Hopewell, Virginia, Ratio techniques, Remote sensing, Pollutants, Water pollution effects, Dredging.

Laboratory and field measurements of spectral reflectance characteristics were made of bottom sediments and water taken from the area near Hopewell, Virginia. Sediments taken from Bermuda Hundred and Bailey Bay were measured in the laboratory for total suspended solids concentrations between 4 and 173 ppm. Also, field measurements of spectral reflectance were made on water from the James River near Bermuda Hundred on two occasions. Results indicate that both Bermuda Hundred and Bailey Bay suspended sediments produce their strongest reflectance in the green and red regions of the spectrum and the general spectral characteristic of Bermuda Hundred suspended sediments is similar to that observed for the James River, with differences related to such factors as spectral resolution, algae content, and particle size distribution. However, the magnitude of reflectance values is quite different between laboratory and field results. Ratio techniques should prove useful for applying remote sensing data to distinguish Bailey Bay sediments from James River sediments in high turbidity plumes, as may occur in dredging. Improved laboratory procedures are needed to simulate spectral reflectance of natural waters in the laboratory and additional tests are recommended to develop and validate these procedures. Such simulations could aid in understanding the effects of adding pollutants and make possible remote sensing to detect pollutants in bottom sediments disturbed by dredging. (Majtenyi-IPA)
W79-00881

DOMES UPPER WATER PHYSICAL OCEANOGRAPHY, A COMPONENT OF THE DOMES PROGRAM,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
D. Halpern.
Deep Ocean Mining Environmental Study (DOMES) Final Report No. 26 (1978) 43 p 23 fig, 3 tab, 9 ref.

Descriptors: *Oceanography, *Baseline studies, *Resources development, Hydrography, *Deep Ocean Mining Environmental Study(DOMES), Ocean mining, Physical oceanography.

Although the primary environmetal impact produced by mining operations will be related to the chemistry and biomass of the region, accurate definition of the environmetal conditions is dependent upon sufficient knowledge of the physical oceanography. The objectives of the DOMES Upper WAter's Physical Oceanograpy component were determined in collaboration with the Principal Investigators of the DOMES Program at a meeting held in Seattle in October 1975. The Objectives were: description of vertical section of temperature, salinity ad density within the upper 1000 m; relative geostrophic curents from analysis of hydrographic measurements; Description of the temporal variability of currents at fixed-levels at each site; description of the thichness of the mixed layer; and description of the temporal variations of wind speed and direction at each site. Data are shown in charts and tables. (NOAA)

W79-00885

DISTRIBUTION AND COMPOSITION OF THE SUSPENDED PARTICULATE MATTER IN THE WATERS OF THE DOMES REGION,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
E. T. Baker, R. A. Feely, J. Nevins, and K. Takahaski.
Deep Ocean Mining Environmental Study (DOMES) Revised Final Report No. 28. April 1978 64 p, 29 fig, 5 tab, 23 ref.

Descriptors: *Metals, *Baseline studies, *Resources development, Environmental effects, *Deep Ocean Mining Environmental Study(DOMES), Deep ocean mining, Suspended matter, Light scattering measurements, Trace metals, Particulate matter.

The DOMES (Deep Ocean Mining Environmental Studies) project is a multidisciplinary research effort designed to assess the marine environmental impacts resulting from commercial mining of deep-ocean manganese nodules. This report describes the results ofthe suspended particulate matter (SPM) program conducted during DOMES cruises RP-8-OC-75 (August 29 to October 16, 1975) and RP-8-OC-76 (February 11 to April 17, 1976) onboard the NOAA ship OCEANOGRAPHER. Light scattering measurements for the quantitative measurement of trace metals are tabulated. Difficulties of measurement are discussed. (NOAA)
W79-00886

TRACE METAL BASELINES IN THE DOMES STUDY AREA,
Washington Univ., Seattle. Dept. of Oceanography.
M. L. Healy.
NOAA/ERL, Pacific Marine Environmental Lab, Deep Ocean Mining Environmental Study (DOMES), Final Rept No. 27. July 1976. 8 p, 2 tab. 03-6-002-35117.

Although the nature and distribution of trace metals in the open ocean is yet open to question, the majority of recent determinations by modern techniques place their Concentrations in the subparts per billion range. The EPA standards (NAS, 1972) for seawater report the hazard level for certain metals as: Fe-300, Mn-100, Pb-50, and Cd-10 ppb. If the discharge plume concentrations from mining operations involve a dilution factor of 10 to the power of 3, and if the increases due to mixing observed in these preliminary data are representative, then it can be concluded that the increases in seawater trace metal concentrations due to the mining operations will be hard to detect. (NOAA)
W79-00887

NITROGEN FERTILIZER MANAGEMENT OF A LEMON ORCHARD AS RELATED TO NITRATE-POLLUTION POTENTIAL OF GROUND WATER,
California Univ., Riverside. Dept. of Soil Science and Agriculture Engineering.
C. Pallares.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 570, Price codes: A06 in paper copy, A01 in microfiche. Doctor of Philosophy Dissertation, January 1978. 98 p. 15 fig, 21 tab, 66 ref, append. OWRT A-057-CAL(1).

Descriptors: *Citrus fruits, *Lemons, *Nitrogen, Nitrites, Groundwater, Irrigation effects, Fertilizers, Water pollution sources, Path of pollutants, California.

A replicated experiment was conducted in Ventura County, California on vigorous lemon trees (Limoneira 8a Lisbon lemon). Differential treatments were started in 1973 and continued through 1976. The objective was to develop nitrogen (N) fertilizer management practices that reduce the potential NO3 pollution of ground waters without having adverse effects on lemon fruit yield and quality. The treatments were designed to investigate the effects of rate, time and method of application on N usage and leaching by a lemon orchard under mulch and no-mulch conditions. Nitrogen balances were calculated. In the balance model, the N in the fertilizer and in the irrigation water were considered as inputs; outputs were N leached and removed in the fruit. Discrepancies between inputs and outputs were attributed to N mineralization from the organic pool, or N immobilization and gaseous losses of N. The N leached was calculated by multiplying the volume of drainage water by its NO3-N concentration at a 167-cm depth. The volume of drainage was estimated by a chloride balance model and measurements of the volume of irrigation water applied to the experimental block. (Snyder-Calif Davis)
W79-00899

A REPORT ON THE USE OF THE MACRORETICULAR RESIN XAD-2 TO ISOLATE PESTICIDES FROM THE CAPE FEAR RIVER,
North Carolina Univ. at Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5A.
W79-00901

CRISIS SCIENCE: INVESTIGATIONS IN RESPONSE TO THE ARGO MERCHANT OIL SPILL,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 5C.
W79-00929

DISTRIBUTION AND ABUNDANCE OF BENTHIC MACROFAUNA IN THE SEWAGE SLUDGE DISPOSAL AREA, NEW YORK BIGHT APEX, FEBRUARY 1975,
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
J. Pearce, J. Caracciolo, M. Halsey, and L. Rogers.
NOAA Data Report ERL MESA-36, November 1977. 38 p, 2 fig, 1 tab, 6 ref.

Descriptors: *Benthos, *Sewage sludge, Sewage disposal, *Outer Continental Shelf, *New York Bight, Ecological distributions, Marine Ecosystems Analysis Program(MESA).

Sandy Hook Laboratory has been examining the impact of ocean waste disposal on the ecosystem of the New York Bight apex since 1968. The benthic community in the apex has been used to indicate impacts because certain bottom-dwelling organisms are often the first to be demonstrably affected by pollutants. The present data report was prepared in order to provide machine listed data and certain statistical calculations, diversity and equitability concerned with the distribution and abundance of benthic organisms found at 24 stations 'nested' within the sewage sludge disposal area of the standard N.Y. Bight, MESA sampling grid. These 'nested' samples will yield additional information on the impact of dumping in the New York Bight by providing a better distributional statistical base and will be used in comparisons with earlier data collected from the same area. (NOAA)
W79-00930

DISTRIBUTION AND ABUNDANCE OF BENTHIC ORGANISMS IN THE NEW YORK-NEW JERSEY OUTER CONTINENTAL SHELF,
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
J. Pearce, J. Caracciolo, M. Halsey, and L. Rogers.
NOAA Data Report ERL MESA-30, December 1977. 79 p, 1 fig, 8 ref, chiefly tables.

Descriptors: *Benthos, *Baseline studies, *Resources development, Water pollution, Waste disposal, *Distribution, Abundance, *Outer Continental Shelf, *New York Bight, Ecological distribution, Ecosystems.

The Outer Continental Shelf Survey was undertaken to provide information on a large of the continental shelf beyond the 20 fm contour. The information obtained from benthic samples taken from this aea will be useful as a basis against which future changes in the ecosystem, due to natural or man-induced phenomena, can be evaluated. The five replicate grab samples from each station will provide a measure of within station variability. This data report was prepared in order to provide machine listed data and certain statistical calculations, diversity and equitability concered with the distribution and abundance of benthic organisms collected during the cruise. (NOAA)
W79-00931

TIDAL AFFECTED DISTRIBUTIONS OF SURFACE CHLOROPHYLL AND TRANSPARENCY IN THE NEW YORK BIGHT,
Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
D. R. Lyzenga, and F. C. Polcyn.
Final Report to NOAA, National Environmental Satellite Service, October 1977. 43 p, 18 fig, 3 tab, 9 ref. 04-6-158-44073.

Descriptors: *Chlorophyll, *Tidal effects, *Water quality, Remote sensing, Color, *Distribution, Outer Continental Shelf, *New York Bight, Transparency.

Multispectral data at two altitudes and two times of day were analyzed. The red/blue and red/green reflectance ratios appear to be useful indicators of chlorophyll and total particulate concentration (or Secci disk transparency) in water. The red/blue ratio technique is sensitive to atmospheric affects. Calculation of atmospheric effects using theoretical models is useful for lending insight into this problem. The second derivative technique holds promise as an indicator of water quality which is relatively insensitive to atmospheric effects. Further empirical and theoretical investigations need to be done with data from various altitudes and water types to establish the limitations of this technique. (NOAA)
W79-00933

POLYCHLORINATED BIPHENYLS, CHLORINATED PESTICIDES AND TRACE METALS IN SOILS OF THE EVERGLADES NATIONAL PARK AND ADJACENT AGRICULTURAL AREAS,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Atmospheric Labs.
A. G. Requejo, R. H. West, G. R. Harvey, P. G. Hatcher, and P. A. McGillivary.
NOAA Technical Memorandum ERL AOML-32, October 1977. 45 p, 24 fig, 5 tab, 7 ref.

Descriptors: *Polychlorinated biphenyls, *Chlorinated hydrocarbon pesticides, *Water pollution sources, Soils, Pesticides, *Florida, Copper, *Metals, *Trace metals, *Everglades, National Park(Fla).

Soil samples collected in May, 1976, from the eastern Everglades National Park and adjacent farmlands were analyzed for polychlorinated biphenyls (PCB's), certain chlorinated pesticides, and trace metals. The results indicate that although concentrations of PCB's, DDT's, Chlordane, and copper are high at agricultural sites, little horizntal movement of these compounds has occurred. In addition, black plastic is identified as the source of PCB's in the area, but the input of these compounds into the Park is minor. (NOAA)
W79-00934

THE AMOCO CADIZ OIL SPILL. A PRELIMINARY SCIENTIFIC REPORT,
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.; and Environmental Research Lab., Narragansett, RI.
NOAA/EPA Special Report, 'The AMOCO CADIZ Oil Spill', April 1978. Wilmot N. Hess (Ed.) 354 p, 66 photos.

Descriptors: *Oil spills, *Water pollution effects, *Oil pollution, *Enviromental effects, Coasts, Beaches, France, *Biological effects, *Amoco Cadiz oil spill, Brittany.

A preliminary account of the United States (EPA and NOAA interagency oil spill response team) scientific efforts in response to the Amoco Cadiz oil spill during the period March 19 to May 15, 1978 is provided. Approximately 64,000 tons of oil came ashore along 72 km of the shoreline of Brittany during the first 2 1/2 weeks of the spill. A prevailing westerly wind pushed the oil against west-facing headlands and into shoreline embayments as it moved east. A wind reversa in early April moved the oil in the opposite direction, contaminating previously untouched areas. Coastal processes and geomorphology played a major role in the dispersal and accumulation of the oil once it came onshore. THe grounded mousse was either eroded away, or buried under new sediment deposits, in response to the vagaries of the beach cycle. A significant percentage of the oil is hypothesized to have sunk to the bottom and been subjected to bottom transport processes. Offshore, high concentrations of oil in water were observed, but near-bottom water usually contained even greater quantities of oil. Adverse biological effects of the spill were observed along the northwest coast of Brittany--a distance of about 150 km of coastline plus numerous rocky out croppings and islands. Mariculture operations for oysters were severely affected and intertidal communities on coastlines facing in a westerly direction were severely impacted. (NOAA)
W79-00935

IRON-ALGAE INTERACTIONS AS A FACTOR IN LAKE ERIE WATER QUALITY,
State Univ. of New York at Fredonia. Environmental Resources Center.
For primary bibliographic entry see Field 5C.
W79-00936

PREFERENTIAL ELIMINATION OF DIELDRIN BY SOME DIATOMS COMPARED TO CHLAMYDOMONAS AND SCENEDESMUS SPECIES,
Marburg Univ. (Germany, F.R.). Fachbereich Biologie.
D. Werner, and E. Morschel.
Bulletin of Environmental Contamination and Toxicology, Vol. 20, No. 3, p 313-319, 1978. 3 fig, 13 ref.

Descriptors: *Dieldrin, *Pesticide kinetics, *Chlamydomonas, *Scenedesmus, *Diatoms, Food chains, Absorption, Aquatic algae, Cytological studies, Path of pollutants, Radioactivity, Techniques, Tracers, Carbon radioisotopes, Pesticide toxicity, Metabolism, *Bioaccumulation, *Biomagnification.

Data was collected on the ability of several species of three genera of microalgae to eliminate the pesticide dieldrin. It was found that Nitschia was better able to eliminate dieldrin than Scenedesmus, which in turn was more efficient than Chlamydomonas. The results did not allow a generalization as to the level of algal classes. (EIS-Deal)
W79-00937

THE EFFECT OF LEAD ON OXYGEN UPTAKE IN THE CRAYFISH, ORCONECTES VIRILIS (HAGEN),
Northern Illinois Univ., De Kalb. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W79-00941

SENSITIVITY OF COASTAL WATERS TO ANTHROPOGENIC TRACE METAL EMISSIONS,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 5A.
W79-00946

AVIAN CHLOREA AND ORGANOCHLORINE RESIDUES IN AN AMERICAN OYSTERCATCHER,
Fish and Wildlife Service, Laurel, MD. Patuxent Wildlife Research Center.
L. J. Blus, L. N. Locke, and E. Cromartie.
Estuaries, Vol. 1, No. 2, p 128-129, 1978. 8 ref.

Descriptors: *Pathogenic bacteria, *Pesticide residues, *DDE, *Animal diseases, Birds, Animal pathology, Bacteria, Cytological studies, Chlorinated hydrocarbon pesticides, pesticides, Path of pollutants, Organic compounds, Chemical analysis, South Carolina, *Cholera, *Avian chlorea, Pasteurella, Oystercatcher, *Tissue analysis, Cape Romain National Wildlife Refuge.

Pasteurella multocida, the causative bacterium of avian cholera, was isolated from cultures of the liver and heart blood of a female adult American oystercatcher found dead on the Cape Romain National Wildlife Refuge, South Carolina. This is apparently the first record of avian cholera in the oystercatcher. Also, low levels of DDE were identified in tissues of the oystercatcher. (EIS-Deal)
W79-00948

UPTAKE, DISTRIBUTION, AND ELIMINATION OF THE LAMPRICIDE 2', 5-DICHLORO-4'-NITRO(14C) SALICYLANILIDE (BAYER 2353) AND ITS 2-AMINOETHANOL SALT (BAYER 73) BY LARGEMOUTH BASS,
Fish and Wildlife Service, Warm Springs, GA. Southeastern Fish Control Lab.
D. P. Schultz, and P. D. Harman.
Journal of Agricultural and Food Chemistry, Vol. 26, No. 5, p 1226-1230, 1978. 3 fig, 5 tab, 6 ref.

Descriptors: *Bass, *Pesticide toxicity, *Lampreys, Organic compounds, Chemical properties, Chemical analysis, Toxicity, Pesticides, Salts, Techniques, Salts, Tracers, Radioactivity techniques, Carbon radioisotopes, Fish physiology, Animal metabolism, Absorption, *Lampricide, Bayer 73, Bayer 2353, *Tissue analysis, *Bioaccumulation, *Biomagnification.

In two groups of largemouth bass exposed to a 0.05 microgram/mL mixturee of the lampricide Bayer 2353 and its salt, Bayer 73 for 24 or 144 h, radioactivity was found in all tissues and organs analyzes. The concentration was highest in the gallbladder and lowest in the muscle. The actual amount of 140 material in the various tissues, when calculated as a percentage of the total in each fish, did not change significantly from one sampling interval to the next except for the bile and liver. Concentrations of 14C material in tissues and organs were dependent on the loading rate of the fish (weight per unit volume of water) in the exposure solution. In a third group of fish exposed to 0.05 micrograms/mL mixture of the lampricide for 24 h and then transferred to lampricide-free flowing water for as long as 14 days, the concentration of 14C material decreased with time in all organs and tissues except in the gallbladder x bile. There was little biomagnification of lampricide in the edible portion ofthe fish.
W79-00951

POLYCHLORINATED BIPHENYLS IN THE BIOMASS OF THE BALTIC,
Uppsala Univ. (Sweden). Inst. of Zoophysiology.
J. E. Kihlstrom, and E. Bergland.
Ambio, Vol 12, No. 4, p 175-178, 1978. 1 fig, 5 tab, 32 ref.

Descriptors: *Polychlorinated biphenyls, Organic compounds, Path of pollutants, Pesticide kinetics, DDT, Air pollution, Fallout, Commercial fishing, Fish physiology, Animal metabolism, *Biomass, Herrings, Biodegradation, Plankton, Commercial fish, *Tissue analysis, *Bioaccumulation, *Baltic Sea.

In spite of restrictions placed on the use of polychlorinated biphenyls (PCBs), some observations indicate that the concentrations of these substances in Baltic organisms have not yet decreased. In order to improve the understanding of this pollution problem the authors have drawn on recent research to estimate the total quantity of PCBs in the Baltic and clarify the ways these substances may be added to and removed from the Baltic ecosystem. There seems to be between two and three metric tons bound to the organisms, one ton of which is in fishes. Of this amount, 0.3 to 0.6 tons are removed annually in the commercial catch of fishes. The main source of the PCBs in the Baltic seems to be atmospheric fallout. According to the few data available this amounts to approxiately 6 tons per year. This factor may explain why concentrations are approximately the same throughout this area. Moreover, if the figures are correct, they indicate that the amounts of PCBSs in the Baltic might be increasing.
W79-00953

A SIMULATION MODEL FOR LEAD MOVEMENT IN A WATERSHED,
Illinois Univ. at Urbana-Champaign. Inst. for Environmental Studies.
G. L. Wheeler, G. L. Rolfe, and K. A. Reinbold.
Ecological Modelling, Vol. 5, p 67-76, 1978. 2 fig, 2 tab, 10 ref.

Descriptors: *Lead, *Path of pollutants, *Model studies, *Watersheds(Basins), *Soil contamination, Public health, Soils, Movement, Benthos, Illinois, Invertebrates, Heavy metals, Metals, Water pollution sources, Plants, Sediments, Environmental effects, *Automotive emission, Accumulations.

A simulation model of the movement and accumulation of automotively emitted lead in a watershed of Central Illinois is presented. The model is composed of four parallel terrestrial subsystems or zones based on traffic volume, and an aquatic system in series. The model x is used to estimate historical accumulations of lead within the watershed and to compare different scenarios of reductions of lead emissions. Since the introduction of leaded gasoline an estimated 570,000 kg of lead has been emitted in the watershed. Of this total about 36% remained airborne and left the watershed, and 3% left the watershed via the aquatic system. Lead is found to be a significant pollutant in urban areas and near major highways. Without emission controls lead is expected to cause environmetal problems after about 25 years.
W79-00954

THE EFFECT OF FENITROTHION ON REPRODUCTION OF A TELEOST FISH, CYPRINUS CARPIO COMMUNIS LINN: A BIOCHEMICAL STUDY,
Punjab Agricultural Univ., Ludhiana (India). Dept of Zoology and Entomology.
For primary bibliographic entry see Field 5C.
W79-00956

DOUNREAY OIL SPILL: MAJOR IMPLICATIONS OF A MINOR INCIDENT,
Leeds Univ. (England). Wellcome Marine Lab.
For primary bibliographic entry see Field 5C.
W79-00961

INFLUENCE OF DOMESTIC WASTES ON ENERGETIC PATHWAYS IN ROCKY INTERTIDAL COMMUNITIES,
California Univ., Irvine. Dept. of Ecology and Evolutionary Biology.
For primary bibliographic entry see Field 5C.
W79-00969

METAL ACCUMULATION AND DEPURATION BY THE AMERICAN OYSTER, CRASSOSTREA VIRGINICA,
National Marine Fisheries Service, Milford, CT. Experimental Biological Investigations.
R. A. Greig, and D. R. Wenzloff.
Bulletin of Environmental Contamination and Toxicology, Vol. 20, No. 4, p 499-504, 1978. 4 tab, 9 ref.

Descriptors: *Absorption, *Oysters, *Animal metabolism, Metals, *Silver, *Cadmium, *Copper, *Zinc, Animal physiology, Path of pollutants, Water pollution effects, Sediments, Water chemistry, Water quality, Water analysis, Bioaccumulation, *Depuration, Tissue analysis.

In the present report, accumulation and depuration of silver, cadmium, copper and zinc by oysters were studied in natural systems. Oysters were transferred from relatively unpolluted water to a polluted area in order to quantify accumulation of metals. The reverse was performed for the examination of depuration. Data on accumulation and depuration for each metal are presented and discussed. (EIS-Deal)
W79-00970

EVALUATION OF TOXICITY OF SOME INDUSTRIAL WASTES TO FISH BY BIOASSAY,
Shri Govindram Seksaria Technological Inst., Indore (India). School of Studies in Botany.
R. C. Trivedi, and P. S. Dubey.
Environmental Pollution, Vol 17, p 75-80, 1978. 1 fig, 2 tab, 8 ref.

Descriptors: *Toxicity, *Bioassay, *Industrial wastes, *Zinc, *Mercury, *Textiles, Water pollution sources, Water pollution effects, Mortality, Sulfates, Seasonal, Metals, Lethal limit, Sulfur compounds, Laboratory tests, Water quality, Barbus, Rayon industry.

Toxicities of effluents from caustic and rayon industries to fish (Barbus stigma) were determined by bioassay. Wastes diluted forty times were still found to be lethal. Zinc, mercury, sulphuric acid and organic matter were the main pollutants. The receiving river was found to be unfit for fish growth up to 35km downstream. Some treatments for such wastes are suggested, and the TLm values discussed. (EIS-Katz)
W79-00978

MERCURY AND THE ESTUARINE MARSH CLAM, RANGIA CUNEATA GRAY. II. UPTAKE, TISSUE DISTRIBUTION, AND DEPURATION,
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W79-00979

SUBSTITUTE CHEMICAL PROGRAM. INITIAL SCIENTIFIC REVIEW OF MSMA/DSMA,
Midwest Research Inst., Kansas City, MO.
T. L. Ferguson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-251 566, Price codes: A00 in paper copy, A01 in microfiche. Environmental Protection Agency, Office of Pesticide Programs, EPA-540/1-75-020, 116 p, December 1975. 2 fig, 14 tab, 32 ref.

Descriptors: *Herbicides, *Pesticide toxicity, *Pesticide kinetics, *Pesticide residues, Chemical properties, Chemical analysis, 2,4,5-T, Toxicity, Path of pollutants, Arsenic compounds, Animal metabolism, Environmental effects, Public health, Organic compounds, *MSMA, *DSMA, *Bioaccumulation, *Biomagnification, *Tissue analysis.

The substitute chemical is reviewed for suitability considering all applicable scientific factors, such as chemistry, toxicology, pharmacology, environmental fate, and movement, use patterns, and efficacy. The major objective of this report is to cover all uses of MSMA/DSMA and is intended to be adaptable to future needs. MSMA/DSMA were identified as registered substitute chemicals for certain cancelled and suspended uses of 2,4,5-T. (EIS-Deal)
W79-00982

REPORT ON FY 1977 NUMERICAL MODELING IN PUGET SOUND,
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program.
C. S. Smyth.
NOAA Technical Memorandum ERL MESA-30, June 1978. 52 p, 13 fig, 14 ref, 3 append.

Descriptors: *Model studies, *Path of pollutants, Floating, Washington, *Mathematical models, Simulation analysis, *Puget Sound(Wash), *Pollutant trajectory models.

A simple single-phase pollutant trajectory model and two basic components, a method for computing surface winds were developed for the Puget Sound region. The model simulates the motion of a number of discrete floting elements under the influence of surface currents, surface winds, and parameterized diffusion. The floating elements may be introduced from several (possibly moving) sources. The computed paths of these elemets approximate the paths that would befolowed by a single-phase floating pollutant. The model is operational and may be accesed bia voice-grade telefphone lines.(NOAA)
W79-00992

A STUDY OF THE SOURCES, TRANSPORT, AND REACTIONS OF SUSPENDED PARTICLES IN WATERS OF THE NEW YORK BIGHT,
University of South Florida, St. Petersburg. Dept. of Marine Science.
P. R. Betzer.
NOAA Technical Memorandum ERL MESA-23, February 1978. 40 p, 6 fig, 9 tab, 13 ref, append. 04-5-022-20.

Descriptors: *Water quality, *Suspended solids, *Water pollution sources, Chemistry, New York, *New York Bight, Suspended particles, Ocean dumping.

Eighty-six samples of suspended matter collected on five cruises to the New York Bight have been subjected to chemical analyses. The results demonstrate that some of the major inputs of particiulate matter to this system can be chemically typed and then traced. Seasonal changes in the distribution ad composition of suspended materials are related to (1) river input, (2) diatom productivity, (3) sediment-2ater interactions, and (4) the dumping of anthropogenic materials.(NOAA)
W79-00993

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME II.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W79-00999

5C. Effects Of Pollution

FLUORIDE ACCUMULATION IN THE TERRESTRIAL AND AQUATIC COMPONENTS OF THE DOUGLAS CREEK DRAINAGE OF WESTERN MONTANA,
Montana Univ., Missoula. Environmental Studies Lab.
C. C. Gordon, and P. C. Tourangeau.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 277, Price codes: A04 in paper copy, A01 in microfiche. Montana University Joint Water Resources Research Ctr, Bozeman Completion Rpt No. 91, December 1977. 45 p, 23 fig, 1 tab, 24 ref. OSWRT A-070-MONT(1).

Descriptors: *Montana, *Douglas Creek, *Water pollution, *Fluorides, *Water pollution effects, *Aquatic environment, *Environmental effects, Pollutants, Metabolism, Aquatic insects, Trout, Diptera, Ephemeroptera, Industrial pollution, Phosphates, Fluoroapatite, Environmental studies, Sampling, Evaluation, Runoff, On-site investigations.

The accumulation of fluorides in terrestrial and aquatic components of Douglas Creek drainage in western Montana was investigated. Samples were collected from nine sites downstream or adjacent to a phosphorus plant located in the area, seven sites upstream from the plant, and one site on Flint Creek above the confluence with Douglas Creek. Samples included vegetation, sediment, aquatic insects, and water. Of the insects studied, those of the orders Ephemeroptera and Diptera which are herbivores, accumulated substantially more fluoride in their body tissues than those which belonged to carnivore or predator species. This indicates that contaminated foliage falling into Douglas Creek could contribute more fluoride to animals in the creek than fluoroapatite dust washed into creek sediment. Fluoride accumulation in tissues of trout species collected in both polluted and unpolluted sections of the creek demonstrated that a high level of variability occurs in both bone and skin tissues of trout. Although fluoride concentrations in bone and skin tissues of trout were excessively high, it is believed that fluoride pollution of this creek is chronic rather than acute. No evidence was found indicating that fluoroapatite dust reaching the creek during phosphate plant operations has caused any serious depletion in its productivity. There is evidence that the fluoroapatite in Douglas Creek is being diluted by washout. (Majtenyi-IPA)
W79-00504

SURVEY, ECOLOGY, AND SYSTEMATICS OF THE UPPER POTOMAC ESTUARY BIOTA: AUFWUCHS MICROFAUNA, PHASE II,
Georgetown Univ., Washington, DC. Dept. of Biology.
D. M. Spoon.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 041, Price codes: A04 in paper copy, A01 in microfiche. Washington Technical Institute Water Resources Research Center Report No. 8, August 1976. 42 p, 22 fig, 11 tab, 8 ref. OWRT B-006-DC(1).

Descriptors: *Model studies, *Sewage effluents, *Sewage bacteria, *Aquatic bacteria, *Fishkill, *Potomac River, Activated sludge, Ecology, Environmental effects, Water quality, Microorganisms, Sewage sludge, Toxins, Protozoa, Water pollution sources, Microbiology, Estuarine environment, Oxidation, Pilot plants, Dissolved oxygen.

Two model rivers, representing Potomac River sites at Hains Point, Blue Plains Sewage Treatment Plant, Broad Creek, and Piscataway Creek connected to a common reservoir containing upriver water, were studied. Each model consisted of four 24-gallon aquaria. In one model at aquarium 2, frozen sewage was added, and in the other, dechlorinated tap water was added. Four attempts made to duplicate the May 1974 fishkill, which took place when river to sewage flow ratio was 20:1, failed: negative results were obtained with aquaria conditions representing river to sewage flow ratios of 20:1, 5:1, 1:1, and 4:4. It was concluded that the fishkill was caused by a toxin in the sewage and not a heat shock or toxin in the river. Dissolved oxygen sag curves in the river model closely approximated those at Potomac River sites at the same temperature. Other studies were done on a 50,000-gallon pilot activated sludge plant before and after hydrogen peroxide treatment of a bulking condition. A new method for counting and studying the activated sludge community was devised using thin plastic film (Handiwrap) coverslips with plastic slides. It was concluded that the protozoan community was little affected by the treatment. The oxygen-induced fragmenting of the filamentous bacteria allowed acanthamoeba to feed. Using tritiated thymidine, a food chain from bacteria to Spirostomum to the ostracod Cypridopsis was confirmed. Ecological studies are reported on the suctorian Lernaeophrya capitata and a list of protozoan and micrometazoan species cultured in the laboratory is provided. (Majtenyi-IPA)
W79-00506

NUTRIENT INPUTS AND ALGAL BLOOMS IN IOWA LAKES,
Iowa State Univ., Ames. Dept. of Animal Ecology.
R. W. Bachmann, and J. R. Jones.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 043, Price codes: A03 in paper copy, A01 in microfiche. Iowa State Water Resources Research Institute Completion Report, June 1976. 31 p, 10 fig, 3 tab, 41 ref. OWRT A-049-IA(2).

Descriptors: *Algal control, *Plankton, *Eutrophication, *Aquatic algae, *Iowa, *Lakes, Water resources, Nuisance algae, Conservation, Chlorophyll, Ecology, Phosphorus, Phosphorus compounds, Nutrients, Water quality, Nitrogen, Surveys, Evaluation.

The development of excess growth of plankton algae in Iowa lakes and reservoirs was investigated in an attempt to learn factors controlling levels of algal chlorophyll and determine if reduction of algal populations is feasible. The sampling studies showed that, in 1975, the average chlorophyll concentration was 72 mg/cu m, causing a poor water transparency with Secchi disk value of about 0.9 m. Algal levels in a sample of 143 lakes were strongly correlated with concentrations of phosphorus. Also, the ratio of nitrogen to phosphorus in Iowa lakes averages 24.2, indicating that phosphorus is most likely the limiting nutrient for algal populations. For natural lakes, summer phosphorus concentration could be calculated using the equation TP -0.84L/z (sigma + rho), where TP is the concentration of total phosphorus in the lake water (mg/cu m), L is the annual phosphorus loading per unit area of lake surface (mg/sq m), z is the mean depth of the lake (m), sigma is the sedimentation rate (year (-1)), and rho is the hydraulic flushing rate. This relationship cannot be applied to artificial lakes, seemingly because of higher sedimentation coefficients. Considering that phosphorus loading to the natural lakes is from general runoff rather than point sources, banning phosphates from detergents of phosphate removal at sewage-treatment plants will not lower phosphorus levels. Because plankton algae growth is linked with phosphorus levels, the implication is that there is not much hope of improving the character of most Iowa lakes. (Majtenyi-IPA)
W79-00510

THE DALY POISONING OF MODERN MAN (IN ITALIAN),
Acad. Gioenia Sci. Nat., Catania, Italy.
G. Di Maggio.
Atti Accad Gioenia Sci Nat Catania 7(5), p 3-18, 1973.

Descriptors: Air pollution, Detergents, Drugs, Food additives, *Herbicides, *Industrial wastes, *Insecticides, *Organophosphorus insecticides, Radioactivity, Water pollution effects.

Various forms of pollution affecting man are reviewed. These include radioactivity, DDT and organophosphorus insecticides, herbicides, food additives, drugs, detergents and industrial wastes. The intake of foods, water and air containing these pollutants and their eventual effects on health are discussed.--Copyright 1978, Biological Abstracts, Inc.
W79-00519

PRODUCTIVITY OF OEDOGONIUM IN LAKE WINGRA, WISCONSIN,
Texas Christian Univ., Fort Worth. Dept. of Biology.
M. D. McCracken, T. D. Gustafson, and M. S. Adams.
Am Midl Nat. 92(1), p 247-254, 1974.

Descriptors: *Aerial photography, Algae, Carbon-14, Imagery, Lakes, Myriophyllum, Nutrients, *Oedogonium, *Productivity, Runoff, Sewer, Storm, Wingra(Wisc), Wisconsin, Absorption.

Productivity of the mat-forming alga Oedogonium was measured in the littoral zone of Lake Wingra, Wisconsin, for 2 seasons with a combination of techniques which included color IR imagery from aircraft, biomass harvesting and 14C uptake. Maximum productivity occurred in July, and was 32.3 mg C.day-1.m-2 lake (1972) and 2.06 g C.day-1.lm-2 algal mat (1971). Annual dry-matter production of Oedogonium in Lake Wingra was 6400 kg in 1971 and 11,500 kg in 1972. Algal mat development was related both to the presence of Myriophyllum and proximity to nutrient-rich runoff from storm-sewer entries to the lake.--Copyright 1974, Biological Abstracts, Inc.
W79-00522

MICROBIOLOGICAL STUDY OF A HYPERSALINE LAKE IN FRENCH SOMALILAND,
Centre Hospitalo-Universitaire-Poitiers (France). Bacteriology Virology Lab.
J. Brisou, D. Courtois, and F. Denis.
Appl Microbiol. 27(5), p 819-822, 1974.

Descriptors: *French Somaliland, Halobacterium-trapanicum, Halococcus-morrhuae, *Hypersaline lakes, Lakes, *Microbiology, Saline lakes, *Salts, Heterotrophic bacteria, *Euryhalines.

In a study of a lake having higher concentration of salts than the Dead Sea, all of the heterotrophic bacteria isolated were aerobes; no strictly anaerobic strains were found. Ninety percent of the strains were euryhalines and 10% were strict halophiles. The extreme halophiles belonged to the species Halobacterium trapanicum and Halococcus morrhuae.--Copyright 1974, Biological Abstracts, Inc.
W79-00523

EFFECTS OF ANTIMYCIN ON STREAM INSECTS,
Wisconsin Univ.-Madison. Dept. of Entomology.
P. M. Kotila, and W. L. Hilsenhoff.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 336, Price codes: A04 in paper copy, A01 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report WIS-WRC 78-05, 1978. 55 p, 8 fig, 10 tab, 196 ref. OWRT A-073-WIS(2), 14-34-0001-7106, 14-34-0001-8053.

Descriptors: *Fish control agents, *Piscicides, *Aquatic insects, *Invertebrates, *Toxicity, Water pollution effects, Wisconsin, Streams, Water pollution control, *Antimycin, Bioassay, *Ashippun River(Wisc).

The toxicity of antimycin to 38 species of Wisconsin stream insects was evaluated in static, aerated bioassays utilizing antimycin exposures typical of stream treatments used to kill fish. Several species of Trichoptera, Ephemeroptera and Plecoptera were very sensitive to fish killing concentrations of antimycin (EC-50 less than 50 ppb). Beetles (Psephenus herricki, Optioservus fastiditus, Stenelmis crenata, Helichus striatus, dragonfly nymphs (Neurocordulia molesta, Gomphurus vastus), damselfly nymphs (Argia apicalis), fishfly larvae (Nigronia serricornis), and snipe fly larvae (Atherix variegata) were relatively unaffected by antimycin (EC-50 greater than 1,000 ppb). Early instars of Tipula spp. and Ephemerella sp. were more sensitive to antimycin than later instars. Exposure to antimycin produced greater mortality at 19C than at lower temperatures in several species, even though exposure times were reduced at the higher temperature. Post-exposure observations indicated mortality may be delayed more than five days, particularly at reduced temperatures. Large differences in antimycin sensitivity were found for different species belonging to the same family (hydropsychid caddisflies, perlid stoneflies). Emergence of several species of stream insects was reduced or prevented by exposure of the mature larvae or nymphs to sublethal concentrations of antimycin. Pycnopsyche guttifer emerged successfully following exposure of the pupae to an antimycin concentration just below that which killed the larvae.
W79-00525

OXYGEN PRODUCTIVITY OF PERIPHYTON ON HIGHER AQUATIC PLANTS (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
For primary bibliographic entry see Field 2I.
W79-00529

SOME ASPECTS OF REDOX TRENDS IN THE BOTTOM MUDS OF A MESOTROPHIC BAYOU ESTUARY,
University of West Florida, Pensacola. Dept. of Biology.
G. A. Moshiri, and W. G. Crumpton.
Hydrobiologia, Vol. 57, No. 2, p 155-158, 1978. 2 fig, 7 ref. OWRT B-024-FLA(3), 14-31-0001-5065.

Descriptors: Sediments, Estuaries, *Oxidation-reduction potential, Mesotrophy, Muds, *Florida, Bayou Texas(Fla), Hydrogen ion concentration, Temperature, Salinity, Bacteria, Organic matter.

Redox profiles, pH, bacterial numbers, and organic content of sediments in Bayou, Texar, Pensacola, Florida, were examined in an effort to delineate spatial and temporal patterns. These data were accompanied by field determinations of dissolved oxygen, pH, temperature, and salinity. The results point to the importance of bacterial activity and bottom water dissolved oxygen upon the redox status of the sediments. It is suggested that, in certain systems, the redox status of deeper sediments may reveal long-term trends which are obscured at the sediment-water interface by transient effects. (Morgan-Florida)
W79-00533

MINERAL CYCLING IN SALT MARSH-ESTUARINE ECOSYSTEMS; ECOSYSTEM STRUCTURE, FUNCTION, AND GENERAL COMPARTMENTAL MODEL DESCRIBING MINERAL CYCLES,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
D. Gunnison.
Available from National Technical Information Service, Springfield, VA 22161 as AD-A052 737 as Price codes: A07 in paper copy, A01 in microfiche. Technical Report D-78-3, January 1978. 150 p, 24 tab, 3 fig, 260 ref, append.

Descriptors: *Heavy metals, *Salt marshes, *Estuarine environment, Ecosystems, *Cycling nutrients, *Dredged material, *Mineral cycling, Model studies.

A nutrient and heavy metal cycling study of marsh-estuarine ecosystems was undertaken for the Dredged Material Research Program. The objective was to gather as much information as possible on mineral cycling in marsh-estuarine ecosystems. A compartmental model outlining pathway of mineral cycling within the marsh-estuarine ecosystem was developed. Approaches used in the study included literature surveys and discussions with authorities in marsh-estuarine ecology. Information from allied fields of research was used to supplement direct sources of information. Chemical release of contaminants from dredged materials may cause problems. Oxygen demands exerted by reduced materials placed in aerobic waters can deplete oxygen. Several heavy metals have increased mobility once their binding sulfides have been oxidized. Oxidation of heavily contaminated marsh soils can cause metal toxicity for plants and cat clay formation. Eutrophication resulting from use of contaminated materials for marsh creation is not a problem, except in unproductive estuaries. Present knowledge is inadequate to permit accurate predictions of environmental impacts resulting from use of heavily contaminated materials in marsh creation. Only those dredged materials containing nutrients and heavy metals in quantities no greater than those in marsh soils at the creation site should be used for marsh development.
W79-00539

AN ASSESSMENT OF THE POTENTIAL IMPACT OF DREDGED MATERIAL DISPOSAL IN THE OPEN OCEAN,
Terco Corp., College Station, TX.
W. E. Pequegnat, D. D. Smith, R. M. Darnell, B. J. Presley, and R. O. Reid.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A053 183, Price codes: A99 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-78-2, January 1978. 645 p, 41 tab, 85 fig, 2 append.

Descriptors: *Oceans, *Environmental effects, Water pollution effects, *Dredged material disposal, *Ocean waste disposal.

Discusses factors which indicate deep ocean disposal of dredged material may need to be utilized more extensively in the future. Evaluates the potential physical, chemical, and biological impacts that may occur from dredged material disposal in the deep ocean at and beyond the outer edge of the continental shelves of the United States and its possessions. Selects and describes oceanic areas (not sites) off eleven sectors of U.S. coasts where officials may select disposal sites. Section A discusses Deep Ocean Disposal Perspectives, and Section B covers Deep Ocean Disposal Environmental Considerations. Parts of Section A are (1) basis and objectives of study with overall evaluation of the need for and impacts of deep ocean disposal of dredged material; (2) discussion of dredging-disposal process and nature of dredged material; and (3) designation of favorable and poor deep ocean areas for dredged material disposal, and criteria for selection. Section B is devoted to (1) discussion of the workings of marine ecological systems, (2) essential oceanographic conditions off coasts of all geographic sectors of the United States and its possessions, and (3) analysis of the fate and potential impact of dredged material disposed in the deep ocean. (WES)
W79-00549

ZOOPLANKTON STANDING CROPS IN THE DISCHARGE OF LAKE FRANCIS CASE, 1966-1972,
Fish and Wildlife Service, Yankton, SD.
D. B. Martin, and J. F. Novotny.
The American Midland Naturalist, Vol. 98, No. 2, October 1977, p 296-307. 4 fig, 4 tab, 7 ref.

Descriptors: *Zooplankton, *Lake Francis Case(SD), *Standing crops, *Reservoir releases, *Seasonal, *Reservoirs, Cyclops bicuspidatus thomasi, Diaptomus, Daphnia pulex, Daphnia galeata mendotae, Species composition, Faunal lists, Lakes, Missouri River, South Dakota, Nutrients, Organic matter.

Zooplankton standing crops in the discharge of Lake Francis Case, a Missouri River reservoir near Lake Andes, South Dakota, were monitored 1966-72 with an automatic plankton sampler. Standing crops of the three major taxa--Cyclops, Diaptomus, and Daphnia--fluctuated predictably, but causes of the fluctuations could not be determined. An important long-run decline in total zooplankton abundance was evident: during 1966-69 average total zooplankton standing crop ranged from 14.0-19.8/liter, while during 1970-72 average total standing crop varied from 5.7-8.7/liter. The reduction was due to a significant decline in Cyclops abundance, without an equivalent increase in Diaptomus or Daphnia abundance. Cyclops, the most abundant taxon during the study, had a strongly bimodal annual distribution with maxima in late spring and early winter. Diaptomus, next most abundant, was unimodal annually, with its maximum from early spring to midsummer. The annual cycle of Daphnia, the only other frequently encountered taxon, was weakly bimodal, with primary maximum in late spring and a secondary maximum in early winter. The decline in zooplankton standing crop does not appear to be caused by fish predation or water management practices. Zooplankton population may have been affected by a probable decline in export of nutrients, organic matter, and zooplankton from the new upstream reservoir, Lake Oahe, which reached operational level in 1969. (Lynch-Wisconsin)
W79-00551

DETRITUS IN THE LAKE ECOSYSTEM,
Connecticut Univ., Storrs. Biological Sciences Group.
P. H. Rich, and R. G. Wetzel.
The American Naturalist, Vol. 112, No. 983, January 1978, p 57-71. 5 fig, 1 tab, 53 ref. ERDA C00-1599-75 and NSF GB-6538, GB-28900X, GI-20.

Descriptors: *Detritus, *Lakes, *Ecosystems, *Carbon, *Energy transfer, Lake Lawrence(MI), Michigan, Ecology, Metabolism, Herbivores, Oxidation-reduction potential, Sediments, Trophic level, Food chains, Benthos, Respiration, Anaerobic conditions, Bacteria.

Present views of the role of detritus in lakes are inconsistent with the ecosystem concept, and underestimate the importance of carbon and energy pathways involving detritus. Nonpredatory losses from a plant-herbivore transfer, particularly in the form of dissolved organic matter and egestion, may be greater than the amount of material and energy transmitted up the grazer food chain. Ecosystem efficiencies are significantly higher than Lindeman (food chain) efficiencies. Benthic anaerobic metabolism (carbon dioxide production) is greater than benthic oxygen uptake estimates indicate; energy-rich intermediate products which undergo deferred respiration (O2 uptake) far from their origin may create oxidation-reduction gradients, drive chemosynthesis, and subsidize bacterial photosynthesis in the water column. Particulate and dissolved aquatic detrital material and its metabolism thus create a dynamic structure in lake sediments and water somewhat analogous to the trophic-dynamic aspect of the biota. Detrital-dynamic structure in lakes is not, however, simply an alternative mode of support for biota, but a major factor in entrainment of abiotic substances which subsidizes the biota. This reevaluation of the role of detritus resulted from a metabolism study in Lake Lawrence, Michigan. Topics covered include: (1) nonpredatory loss, (2) anaerobic respiration, (3) implications of benthic detrital electron flux, and (4) role of detritus. (Lynch-Wisconsin)
W79-00552

DEPENDENCE OF OXYGEN EVOLUTION AND UPTAKE BY CHLORELLA UPON THE NATURE OF LIGHT FIELD DISTRIBUTION IN THE SUSPENSION,
Akademiya Nauk SSSR, Pushchino. Inst. of Biological Physics.
A. B. Brandt, M. I. Kiseleva, and G. Z. Finakov.
Soviet Plant Physiology, Vol. 23, No. 4, July 1976, p 596-600. Translated from Fiziologiya Rastenii, Vol. 23, No. 4, July-August 1976, p 710-714. 3 fig, 2 tab, 26 ref.

Descriptors: *Chlorella pyrenoidosa, *Light, *Oxygen, *Photosynthesis, *Suspension, *Polarographic analysis, Absorption, Algae, Cultures, Respiration, Density, Gas exchange, Metabolism, Energy.

Polarography was used to investigate rates of oxygen evolution (photosynthesis) and uptake (respiration) as a function of density of a Chlorella pyrenoidosa suspension, and distribution of the light field in the polarographic cell. Results indicate a promising outlook for the proposed polarographic method and cell design in studying gas exchange of unicellular autotrophic algae. At wholly equal absorption of impinging radiation by the Chlorella suspension, the specific energetic photosynthetic activity of cells in the suspension was practically the same. Specific photosynthetic activity of the cells increased significantly with decrease of suspension density and assurance of sufficient illumination of cells in all layers of the polarographic cell. Even such a high PAR irradiance as 622 W/sq m is therefore not photosynthesis-saturating in Chlorella. The respiration rate of Chlorella cells depended upon conditions of their preliminary illumination. Cell respiration activity increased with light and with increases in the specific efficiency of photosynthesis; this relationship is attributable not only to direct light stimulation of metabolic processes, but also to greater accumulation of primary photosynthetic products at high specific photosynthesis with good illumination, leading to greater energy expenditure for secondary conversions. The polarographic cell consisted of a plexiglas chamber with a volume of 20 cu cm. (Lynch-Wisconsin)
W79-00553

FOOD SIZE SELECTION AND SEASONAL SUCCESSION OF FILTER FEEDING ZOOPLANKTON IN AN EUTROPHIC LAKE,
Warsaw Univ. (Poland). Dept. of Hydrobiology.
Z. M. Gliwicz.
Ekologia Polska, Vol. 25, No. 2, 1977, p 179-225. 12 fig, 3 tab, 83 ref.

Descriptors: *Zooplankton, *Filter feeders, *Eutrophication, *Mikolajskie Lake(Poland), *Succession, *Food habits, *Seasonal, Particle size, Size, Lakes, Poland, Crustaceans, Algae,

Filamentous algae, Limiting factors, Grazing, Phytoplankton, Daphnia cucullata, Daphnia longispina, Bosmina coregoni, Eudiaptomus graciloides, Diaphanosoma brachyurum, Chydorus sphaericus, Net phytoplankton.

Data on seasonal changes in zooplankton and phytoplankton in eutrophic Mikolajskie Lake, Poland, were used to assess effects of small (edible) and large (inedible) algae on succession of plankton crustaceans, and upon the demography of planktonic filter feeders. Results showed that filtering rate, feeding rate, fecundity, and abundance of some species (group 1 below) are more strongly limited by available food concentration, while in other species (group 2) these characteristics are limited by high concentrations of large, filamentous algae. The former group are distinguished by a smaller upper size limit of particles grazed (and a narrower gap between carapace margins in cladocerans), and the latter by a greater upper size limitk and therefore by greater susceptibility to filtration interference by net phytoplankton. In Mikolajskie Lake the following seasonal succession of the two groups occurs: (1) spring increase of group 1--Daphnia cucullata, D. longispina, Bosmina coregoni, and Eudiaptomus graciloides, peaking in June; (2) summer decline of this population, coinciding with an increase in group 2--Diaphanosoma brachyurum and Chydorus sphaerieus; and (3) autumn return of the first population with decline of the second. Net phytoplankton concentration seems to have a greater limiting influence on competitively stronger species, permitting the appearance and persistence of competitively weaker species. (Lynch-Wisconsin)
W79-00554

ZONATION OF MARINE GASTROPODS ON A ROCKY INTERTIDAL SHORE IN THE ADMIRALTY GULF, WESTERN AUSTRALIA, WITH EMPHASIS ON THE GENUS NERITA,
Western Australian Museum, Perth.
F. E. Wells.
The Veliger, Vol. 20, No. 3, January 1977, p 279-287. 3 fig, 2 tab, 18 ref.

Descriptors: *Nerita reticulata, *Gastropods, *Shores, *Admiralty Gulf(Australia), *Zonation, *Species diversity, Species composition, Walsh Point(Australia), Australia, Snails, Nerita undata, Nerita polita, Mollusks, Habitats, Tidal effects, Gulfs, Littoral, Rocks.

Zonation of marine gastropods on the rocky intertidal shore of Walsh Point, Admiralty Gulf, western Australia, studied in fall 1976, showed highest diversity in middle areas, tapering off toward both higher and lower portions of the shore. Although it would be expected that diversity would be highest in the lower intertidal area covered by seawater for the longest periods, the beach structure at Walsh Point provides an explanation. Rocks of the mid-tide region are large and close together, thus providing abundant and stable crevices for snails to retreat into during low tide; in the lower portion of the zone rocks are spaced about 30 cm apart, precluding such refuges. A total of 3375 individuals belonging to 18 gastropod species were collected for this study, although a broader survey of mollusks in the gulf indicates at least 75 species of gastropods occur at Walsh Point. Two species of Nerita were overwhelmingly dominant, with N. reticulata accounting for 38.9% of all specimens and N. undata 32.3%; a third species, N. polita, accounted for 1.8%. N. polita was mostly located away from the other two, being an upper intertidal species. The index of overlap between N. polita and N. reticulata was only 0.07, while between N. polita and N. undata, which occupies the intermediate position on the shore, the overlap was much higher, 0.29. Overlap between N. undata and N. reticulata was substantial, although there was some segregation. (Lynch-Wisconsin)
W79-00555

AN APPROACH TO QUANTITATIVE NUTRITION OF PHYTOPLANKTON,
Scottish Marine Biological Association, Oban.
M. R. Droop.
The Journal of Protozoology, Vol. 24, No. 4, November 1977, p 528-532. 2 fig, 1 tab, 25 ref.

Descriptors: *Phytoplankton, *Mathematical models, *Nutrients, *Plant growth, *Substrates, Algae, Model studies, Vitamins, Ecology, Biomass, Monod model, Limiting factors.

A two-compartment model of phytoplankton growth in relation to nutrients is able simultaneously to handle multiple nutrients and organisms in an environment of changing inputs and outputs. The simple one-compartment Monod model for substrate-limited growth is discussed, which requires cells to be in equilibrium with their surroundings. But including conservative substrates--those not required--complicates the analysis. Chemical composition of cells is sensitive to environmental conditions, including the specific growth rate itself. Since the compounds under investigation were never the controlling substrate, there is nothing to suggest they might still vary with growth rate had they been in control. In 1968 the correlative suggestion was made that growth rate was related to internal substrate level rather than vice-versa. Subsequent work unequivocally demonstrated the interdependence of specific growth rate and internal concentrations of these limiting nutrients. Growth rate was apparently controlled by the level of the internal pool. The two-compartment model represents a modification of the Monod model to incorporate these developments. An example of the model's performance in a batch culture is given. It is noted that for such models to be of real value to ecologists the community as a whole must be modelled. (Lynch-Wisconsin)
W79-00556

BIOLOGICAL INTERACTIONS AND THE REALIZED NICHE OF EUPLOTES VANNUS FROM THE SALT MARSH AUFWUCHS,
New York Inst. of Tech., Old Westbury. Dept. of Life Sciences.
W. A. Muller, and J. J. Lee.
The Journal of Protozoology, Vol. 24, No. 4, November 1977, p 523-527. 5 fig, 1 tab, 34 ref.

Descriptors: *Euplotes vannus, *Niches, *Allogromia laticollaris, *Chromadorina germanica, *Ecology, *Competition, Salt marshes, New York, Littoral, Ecosystems, Ciliates, Biological communities, Herbivores, Food habits, Limiting factors, Nutrients, Hydrogen ion concentration, Protozoa, Periphyton, Eutrophication, Algae.

Biological interactions of the hypotrich ciliate protozoan Euplotes vannus with two other herbivores, the foraminiferan Allogromia laticollaris, and the nematode Chromadorina germanica were studied in nutrient limiting and nutrient non-limiting situations. E. vannus is a member of diverse communities of microorganisms, small algae, and small animals, functionally interwoven in time and space, which help transform macrophyte structural materials into compounds usuable by larger carnivorous and omnivorous animals. E. vannus, which grows well over broad ranges of temperature and salinity, requires higher densities of food (>10,000 cells/ml) for rapid reproduction than do A. laticollaris (>100 cells/ml) and C. germanica (1000 cells/ml or less). With initially high food levels (about one million cells/ml) the ciliates reproduced rapidly and consumed algae faster than it could reproduce. Some balance between algae and ciliates was achieved at initial algal concentrations of about 100,000 cells/ml. With equal numbers of the three species studied in microcosm experiments at 25C, E. vannus competed very poorly, reaching only 20% of control levels when grown with C. germanica and 13% when cultured with A. laticollaris. It competed better in two-species microcosms when temperatures were lower and when its ratio to the other species was initially higher. Organisms were originally isolated from North Sea Harbor, Long Island, New York. (Lynch-Wisconsin)
W79-00557

LIMNOLOGICAL STUDY OF THE CHICA DE SAN PEDRO, LA POSADA AND LO MENDEZ LAGOONS: I. QUANTITATIVE AND QUALITATIVE ANALYSIS OF WINTER PLANKTON (IN SPANISH),
Concepcion Univ. (Chile). Dept. of Botany.
O. O. Parra, V. Dellarossa, and E. Ugarte.
Bol Soc Biol Concepcion 50, p 73-86, 1976.

Descriptors: *Phytoplankton, *Zooplankton, *Lagoons, Analysis, Bioassay, Distribution, *Chile, Eutrophication, Water pollution.

A qualitative and quantitative analysis of winter phytoplankton and zooplankton from 3 Chilean lagoons, Concepcion, Chile were carried out. A comparative study of the different planktonic groups identified the dominant species for each lagoon. Tables of monthly distribution and abundance values of the species are included.--Copyright 1978, Biological Abstracts, Inc.
W79-00558

ENZYMATIC RELEASE OF PHOSPHATE IN WATER FROM SUBARCTIC LAKES IN NORTHERN SWEDEN,
Uppsala Univ. (Sweden). Inst. of Limnology.
M. Jannson.
Hydrobiologia, Vol. 56, No. 2, p 175-180. 3 fig, 1 tab, 18 ref.

Descriptors: *Enzymes, *Phosphates, *Phosphatases, *Seston, *Particulates, *Plankton, *Degradation(Decomposition), Sweden, Lakes, Subarctic, Nutrients, Tracers, Phosphorus, Hydrolysis, Lake Stugsjon(Sweden), Lake Hymenjaure(Sweden), Lake Magnusjaure(Sweden), Filtration, Eutrophication, Chromatography.

In a study of phosphatase activity and phosphate regeneration in three small subarctic lakes in northern Sweden, considerable amounts of phosphate from autoclaved water were released by phosphatases. Particulate matter was also demonstrated to be an important source of phosphorus to planktonic organisms, and a possible substrate for phosphate-releasing enzymes. Exposure of autoclaved 32phosphorus-labelled plankton to lake enzymes, followed by characterization of degradation products with gel chromatography, showed that phosphate was enzymatically released from particulate matter. That seston is a vitally important phosphorus source for plankton was indicated by high phosphatase activity resulting from inoculation of seston-free lake water with plankton. Three experiments were conducted during this study: (1) addition to unfiltered autoclaved lake water of a concentrate of lake enzymes prepared by ultrafiltration; (2) inoculation of plankton into different filtrates of lake water; and (3) addition of an enzyme concentrate to autoclaved 32phosphorus-labelled seston in autoclaved nonradioactive lake water. The lakes studied were Lake Stugsjon, Lake Hymenjaure, and Lake Magnusjaure. Lake Stugsjon is oligotrophic, with a total phosphorus concentration of about seven micrograms/liter and total nitrogen of about 200 micrograms/liter. The other two lakes are changing from oligotrophy to increasing eutrophication due to artificial phosphorus and nitrogen enrichment. (Lynch-Wisconsin)
W79-00559

THE OCCURRENCE OF INTERNAL PHOSPHORUS LOADING IN TWO SMALL,

EUTROPHIC GLACIAL LAKES IN NORTHEASTERN OHIO,
Kent State Univ., OH. Dept. of Biological Sciences.
G. D. Cooke, M. R. McComas, D. W. Waller, and R. H. Kennedy.
Hydrobiologia, Vol. 56, No. 2, 1977, p 129-135. 2 fig, 2 tab, 23 ref. EPA R-80193605.

Descriptors: *Eutrophication, *Twin Lakes(OH), *Nutrient budget, *Phosphorus, *Internal loading, *Water pollution sources, Lake restoration, Water pollution control, Ohio, Lakes, Glacial lakes, Nutrients, Sediments, Macrophytes, Sediment-water interfaces.

Nutrient budgets for the small, eutrophic Twin Lakes of northeastern Ohio during the summers of 1972-74 indicate that 65-100% of the summer increase in phosphorus content in the water is due to internal loading. Internal loading appears to delay recovery of each lakes following nutrient diversion, and chemical inactivation of phosphorus with aluminum hydroxide may be necessary. Water samples were collected in East and West Twin Lakes and in three inflowing streams, and analyzed for total phosphate-phosphorus; water temperature was also monitored. Possible loading sources: (1) Phosphorus release from anoxic sediments, (2) seston sedimentation, (3) groundwater income, (4) wind stress causing transfer of nutrient-rich hypolimnetic water to the epilimnion, (5) macrophyte transport of phosphorus from sediment to water, and (6) epiphyte excretion. Results of this study conflict with previous studies of the experimental Canadian Shield lakes, possibly due to the latter not having large nutrient reservoirs in the sediments as are found in naturally eutrophic lakes. The Twin Lakes are kettle-type lakes receiving upland drainage, urban runoff, and, until 1972, septic tank discharge; there is no agricultural drainage. The lakes thermally stratify by mid- to late April and remain stratified until mid-November. Macrophyte growth is extensive, covering 25% of the lake area. (Lynch-Wisconsin)
W79-00560

STRUCTURAL CHARACTERISTICS OF A DIATOM COMMUNITY EPIPHYTIC ON RUPPIA MARITIMA,
Rutgers - The State Univ., New Brunswick, NJ. Dept. of Entomology and Economic Zoology.
M. J. Sullivan.
Hydrobiologia, Vol. 53, No. 1, 1977, p 81-86. 1 fig, 5 tab, 11 ref.

Descriptors: *Ruppia maritima, *Diatoms, *Epiphytes, *Great Bay salt marsh(NJ), *Species diversity, *Biological communities, Algae, Salt marshes, New Jersey, Navicula pavillardi, Spartina alterniflora, Widgeon grass, Marsh plants, Floral lists, Diversity indices, Shannon-Wiener index, Similarity, Analytical techniques.

A study of structural characteristics of the epiphytic diatom community on widgeon grass (Ruppia maritima) in New Jersey's Great Bay salt marsh (May-September 1975) showed high community diversity during initial R. maritima growth, followed by sustained low levels after host vegetative growth had ceased and no new attachment sites were available. Although 57 diatom taxa were identified, Navicula pavillardi, the dominant taxon, accounted for one-third of all individuals collected. Leaves and internodes of R. maritima support a single, nearly homogeneous epiphytic diatom community; differences between leaves and internodes are minimal, according to analysis of variance and to Stander's similarity index. Marsh sediments are the major source of individuals for Ruppia colonization, as indicated by comparing the epiphytic diatom community with diatoms inhabiting the marsh proper. The salt marsh is dominated by dwarf Spartina alterniflora; two pools known to support luxuriant Ruppia growth were sampled monthly for the study. After taxonomic analysis, species diversity (H') was calculated using the Shannon-Wiener informational index. Species diversity, number of diatom taxa in a given sample, and relative abundance of 12 abundant taxa were subjected to two-way analysis of variance (date x site). (Lynch-Wisconsin)
W79-00561

NUTRIENT LIMITATION OF PHYTOPLANKTON IN A CENTRAL ARIZONA RESERVOIR,
Arizona State Univ., Dept. of Botany and Microbiology.
N. L. Crane, and M. R. Sommerfeld.
Hydrobiologia, Vol. 51, No. 3, 1976, p 219-224. 4 fig, 2 tab, 29 ref.

Descriptors: *Limiting factors, *Phytoplankton, *Lynx Lake(AZ), *Nitrogen, *Phosphorus, *Carbon, Nutrients, Arizona, Reservoirs, Lakes, Algae, Chlorophyll, Hydrogen ion concentration, Dissolved oxygen, Species composition, Chlorella, Scenedesmus, Cosmarium, Standing crops, Biomass.

Additions of nutrients (nitrogen, phosphorus, and carbon) individually and in combinations to eight polyethylene bags partially submerged in Lynx Lake, near Prescott, Arizona, a reservoir characterized by low nitrogen and phosphorus levels and a sparse, nondiverse phytoplankton population, showed that only nitrogen and phosphorus together limited the phytoplankton. Large increases in phytoplankton numbers, extractable chlorophyll, pH, and dissolved oxygen occurred only in bags to which either nitrogen-phosphorus, or nitrogen-phosphorus-carbon were added, but not in bags with nutrients added individually or in other combinations. Maximum populations were obtained on the tenth day after nutrient addition, and were two to three times that of the control. Little alteration in species composition was observed. Chlorella sp. dominated, with Scenedesmus sp. and Cosmarium sp. also prevalent. The diatoms Epithemia sorex, Rhodopalia gibba, Synedra tabulata, and Synedra ulna were present in small numbers. Nutrient concentrations are low throughout the year in the lake, with less than 0.01 mg/liter orthophosphate-phosphorus and 0.02 mg/liter nitrate-nitrogen. The polyethylene bags, 43 cm in diameter and 1.0 m in length, were submerged to within 15 cm of the top, and kept afloat by wooden frames. Nutrients were added as solutions of the salts NaHCO3, NaNO3, and Na2HPO4. (Lynch-Wisconsin)
W79-00562

AMMONIA-NITROGEN EXCRETION IN DAPHNIA PULEX,
North Dakota State Univ., Fargo. Dept. of Zoology.
T. R. Jacobsen, and G. W. Comita.
Hydrobiologia, Vol. 51, No. 3, 1976, p 195-200. 4 fig, 14 ref.

Descriptors: *Daphnia pulex, *Ammonia, *Nitrogen, *Excretion, *Water temperature, *Weight, Eutrophication, Phytoplankton, Algae, Silver Lake(MN), Minnesota, Lakes, Chlamydomonas reinhardi, Zooplankton, Energy budget, Proteins, Amino acids.

Ammonia-nitrogen excretion rates of the zooplankter Daphnia pulex in natural summer and cultured populations (from Silver Lake, Clay County, Minnesota) appear partially dependent on temperature and dry body weight, but are probably also affected by food concentration and physiological/environmental influences. An inverse relationship between ammonia-nitrogen excretion and phytoplankton blooms is likely. Ammonia-nitrogen excretion dropped from 0.26-28 micrograms N/animal/day before and after the first bloom in late June (1973) to 0.1 micrograms during the second and third blooms in late July and late September, then increased to 0.145 micrograms. Temperature during the three blooms was 20, 25, and 15C. indicating ammonia-nitrogen excretion may be more dependent on factors other than temperature. One explanation for the excretion rate decrease during blooms may be utilization of proteins and amino acids as secondary energy sources. The mean ammonia-nitrogen excretion rate for the summer population was 0.2 micrograms N/animal/day, or 5.11 micrograms N/mg dry body wt/day (N=80) measured at 15, 20, and 25C. Excretion rates of D. pulex cultured on Chlamydomonas reinhardi yielded the temperature relationship Log10E=(0.061) T 1.773, where E is micrograms N/animal/day and T is temperature. Excretion on a mg dry body wt/day basis was related to temperature as Log10E=(0.043) T + 0.153, where E is micrograms N/mg dry body wt/day. (Lynch-Wisconsin)
W79-00563

SPECIES DENSITIES OF MACROBENTHOS ASSOCIATED WITH SEAGRASS: A FIELD EXPERIMENTAL STUDY OF PREDATION,
Smithsonian Institution, Fort Pierce, FL.
D. K. Young, M. A. Buzas, and M. W. Young.
Journal of Marine Research, Vol. 34, No. 4, 1976, p 577-592. 2 fig, 6 tab, 44 ref, 1 append.

Descriptors: *Density, *Seagrass, *Predation, *Benthic fauna, *Invertebrates, *Indian River estuary(FL), *Food webs, Ecosystems, Fish, Crustaceans, Decapods, Halodule wrightii, Florida, Estuaries, Rivers, Faunal lists, Carnivores, Deposit feeders, Cages, Food habits, Macrofauna.

Predator exclusion cages were monitored October 1974-Febrary 1975 at three sites in the Indian River estuary, east-central Florida, to determine the effects of the cages on benthic invertebrates larger than one mm associated with the seagrass Halodule (=Diplathera) wrightii. At two sites (Haulover Canal and Link Port) the expected increase in species density occurred, while at the third, St. Lucie, Species density decreased, due probably to predation from carnivorous decapod crustaceans found in larger numbers at this site. The decapods were protected from fish predation by the cage. Multivariate analysis of variance with interaction, used to assess densities of 33 numerically dominant macrofaunal species at the three sites, demonstrated previously unrecognized differences in caging effects. The overall time hypothesis of the model was significant at all sites, but the time of experiment initiation may determine effects of a particular cage, as evidenced by the fact that the same species did not attain maximum densities simultaneously. Thirty-two of the dominant species were grouped as r-strategists (or opportunists, whose densities were strongly regulated by predation as well as by undetermined chance events. Because of their food web interrelationships, decapod predation probably increases the efficiency of fish consumption of seagrass-associated mcrofauna. Dominant species included 17 deposit feeders, seven suspension feeders, six carnivores, and three herbivores-scavengers. (Lynch-Wisconsin)
W79-00564

TRANSPORT LIMITED NUTRIENT UPTAKE RATES IN DITYLUM BRIGHTWELLII,
Johns Hopkins Univ., Baltimore, MD. Dept. of Geography and Environmental Engineering.
W. J. Pasciak, and J. Gavis.
Limnology and Oceanography, Vol.20, No. 4, July 1975, p 604-617. 6 fig, 5 tab, 11 ref. NSF GA-36282.

Descriptors: *Ditylum brightwellii, *Nutrients, *Absorption, *Limiting factors, *Transport, *Phytoplankton, *Plant growth, Algae, Diffusion, Nitrates, Nitrites, Shear, Shape, Equations, Michaelis-menten relationships.

Transport limitation of nutrient rate, demonstrated experimentally for the marine unicellular diatom Ditylum brightwellii, can be presumed to occur for other species. This factor may be important for

studying phytoplankton growth under natural conditions. The present study extends to cylindrical and disk-shaped cells an earlier analysis of diffusional transport limitation of nutrient uptake rates applied to spherical cells. Data show that transport limitation of nitrate and nitrite uptake rates by the phytoplankter occurred at low concentrations in still media, and that when the organism was placed in a sufficiently high shear field, transport limitation was overcome; transport limitation also disappeared at high nutrient concentration, and limitation effect was decreased by mixing. D. brightwellii was chosen for the experiments because it could show transport-limited uptake at low nutrient concentrations, is easily cultured, and because its nitrate and nitrite uptake rates have been extensively studies. Culture medium was half seawater and half 2.5% sodium chloride solution, supplemented by trace metals and vitamins, and all tests were conducted at 18-20 C. In most experiments nitrate was the limiting nutrient. In the shear field experiments, conducted in special apparatus (described), the rate of shear was kept temporally and spatially constant. Uptake rates could be directly compared for still ad moving cells. (Lynch Wisconsin)
W79-00565

LIGHT RESPONSES OF DAPHNIA PULEX,
Wisconsin Univ.-Madison. Lab. of Limnology.
S. C. Stearns.
Limnology and Oceanography, Vol. 20, No. 4, July 1975, p 564-570. 3 fig, 3 tab, 19 ref.

Descriptors: *Daphnia pulex, *Light, *Color, *Wavelengths, *Diel migration, *Food habits, Biorhythms, Zooplankton, Cladocera, Grazing, Phytoplankton, Algae, Diurnal.

The cladoceran Daphnia pulex was tested for activity responses to different wavelengths of light at constant intensity, and in white light at fixed intensity. Purposes were to (1) check Smith and Baylor's conclusions that daphnids respond to color changes, (2) assess reliability of ambient light color as a guide for zooplankton grazers in locating food (algae) as postulated by Smith and Baylor, and (3) learn if daphnids have a circadian response to light intensity that could bias results at different times of the day. Smith and Baylor observed that at wavelengths of incident light below 500 nm D. magna tended to roam horizontally, while at wavelengths above 600 nm they tended to stay in place through a vertical hop-and-sink motion; they proposed that such behavior would either maintain the daphnids under algae where the light may be reddish, or in clear water dominated by blue-green wavelengths impel them to seek out algae. Results of te current testing showed that: (1) Daphnids tend to move vertically between 480 (blue ad 735 (red) nm, and horizontally at 440 nm (violet) and in white light, thus corroborating Smith and Baylor's observations. (2) The color of ambient light is probably not a reliable indicator for 300 plankton in finding phytoplankton. (3) D. pulex exhibit a circadian activity rhythm, with total activity low at night, increasing to a peak in the morning, and declining through the afternoon. (Lynch-Wisconsin)
W79-00566

SESTON DYNAMICS AND TRIPTON SEDIMENTATION IN THE PELAGIC ZONE OF A SHALLOW EUTROPHIC LAKE,
Wisconsin Univ.-Madison. Lab. of Limnology.
A. Gasith.
Hydrobiologia, Vol. 51, No. 3, 1976, p 225-231. 3 fig, 2 tab, 21 ref. NSF AG-199 BMS 69-01147 A 09.

Descriptors: *Seston, *Tripton, *Sedimentation, *Organic matter, *Lake Wingra(WI), *Eutrophication, Pelagic zone, Lakes, Sediments, Phytoplankton, Zooplankton, Macrophytes, Productivity, Carbon, Wisconsin, Shallow water, Particulates, Benthic flora, Detritus, Suspended solids, Insects.

Transport of organic matter from water column to sediments in shallow eutrophic Lake Wingra (Madison, Wisconsin) was investigated, as well as the relationship between dynamics of total suspended matter (seston) and the settleable fraction (organic detritus, or tripton). Corrections were made to eliminate resuspended bottom sediments (and living components) from tripton measurements. Results show that sedimentation of tripton is closely related to seston dynamics, with a lag of two to four weeks. Tripton sedimentation rate ranged from 0 g/sq m/day in May to eight g in August. Relative to seston standing crop, maximum sedimetation rate was 8% seston/day (in September). Annual tripton sedimentation is estimated at 632 g dry wt (215 C/sq m), equivalent to 55% of annual phytoplankton production ad 42% of combined annual phytoplankton and macrophyte production. An estimated 70% of settling organic matter is decomposed annually, indicating that only a small fraction of tripton is represented in the long-term accumulation of bottom deposits. Possible factors influencing tripton sedimentation include: (1) water turbulence, (2) differences in phytoplankton associations, and (3) phytoplakton-zooplankton interactions. High orgaic content of seston and significant correlation between phytoplankton productivity and seston concentration suggest that the pelagic seston in Lake Wingra is primarily of planktonic origin. (Lynch Wisconsin)
W79-00567

A QUANTITATIVE STUDY OF THE PHYTOPLANKTON OF THE RIVER AVON, BRISTOL,
Ankara Univ. (Turkey). Dept. of Systematic Botany.
G. Aykulu.
British Phycological Journal, Vol. 13, No. 1, March 1978, p 91-102. 3 fig, 1 tab, 6 ref.

Descriptors: *Phytoplankton, *Avon River(England), *Seasonal, *Rivers, *Species composition, Benthic flora, Benthos, England, Diatoms, Centric diatoms, Chlorophyceae, Cryptophyceae, Nutrients, Biomass, Succession, Algae, Cryptomonas.

Quatitative study (June 1972-August 1973) of the phytoplankton of the River Avon, England, shows dominance by centric diatoms, with Chlorophyceae richest in number of species, and the cryptophyte cryptomonas sp. of ten abundant. Centric diatoms increase in spring and autumn, and chlorophyceae are abundant in summer. Total phytoplankton increases downstream. Phytoplankton numbes are generally high in midspring and summer, decrease gradually toward the end of autumn, and are low in winter. Nutrients apparently do not limit algal growth in the river. Phytoplankton of the River Avon are very similar in species emposition to those of the rivers Lee, Stour, Kennet, Thames, and Severn; this suggests a common planktonic flora dominated by small centric diatoms (Stephanodiscus, Cyclotella, and Thalassiosira), with a fairly regular occurrence of the pennate Nitzschia acicularis, and subsidiary roles for flagellate and cooccoid Chlorophyta. Although species are fewer in number and less varied in the rivers than in lakes, there are similarities with eutrophic lake plankton. True river plankton definitely exist, and are not merely derived from the benthos; they are instead species which only reproduce rapidly when suspended in the water, but are able to maintain themselves while sedimented and entangled in the debris of the benthos. (Lynch Wisconsin)
W79-00568

TRANSLOCATION OF PHOTOASSIMILATED 14C IN THE RED ALGA POLYSIPHONIA LANOSA,
Leeds Univ. (England). Dept. of Plant Sciences.
C. H. C. Turner, and L. V. Evans.
British Phycological Journal, Vol. 13, No. 1, March 1978, p 51-55. 1 fig, 1 tab, 6 ref.

Descriptors: *Polysiphonia lanosa, *Carbon radioisotopes, *Rhodophyta, *Photoassimilates, *Ascophyllum nodosum, *Translocation, *Plant physiology, *Reproduction, Epiphytes, Algae, Photosynthesis, Darkness, Procarps, Carbospores, Metabolites, Metabolism, Respiration, Spores.

Procarps (the female organ of red seaweed) of the epiphytic red alga Polysiphnia lanosa continued to accumulate carbon-14 in the dark and in the absence of external radioactivity, following photosynthetic carbon-14 assimilation. Accumulation is shown to be derived from photoassimilates originating in the gametophytic tissue supporting the procarp. Results thus establish that translocation of photoassimilates occurs within p. lanosa, and that an effective distribution of any metabolites derived from its host plant, Ascophylum nodosum, could occur withing the epiphyte. The ultimate goal of this research is to determine if directional translocation of assimilate occurs between ascopyllum nosdusum and its epiphyte P. lanosa. Sporulating tissue was used in the experimets, where significant assimilate movement might be expected. Sterily P. lanosa plants and female plants bearing a procarps were collected at Culler-coats in northeast England in September. Although movement of metabolites through intct pit connections is unlikely, and no other from of intercellular connection has been found, substances must move between red algal cells. During such periods as cystocarp development, pit connections break down and disappear, undoubtedly assisting in bulk translocation of photoassimilates which apparently occurs at that time. Rhodophyte growth and development may therefore be controlled to some degree by seasonal and perhaps selective breakdown of pit connections. (Lynch-Wisconsin)
W79-00569

CHANGES IN CARBON AND NITROGEN CONTENT DURING DECOMPOSITION OF THREE MACROPHYTES IN FRESHWATER AND MARINE ENVIRONMENTS,
Oakland Univ., Rochester, MI. Dept. of Biological Sciences.
R. D. Hunter.
Hydrobiologia, Vol. 51, No. 2, 1976, p 119-128. 4 fig, 2 tab, 31 ref.

Descriptors: *Carbon, *Nitrogen, *Degradation(Decomposition), *Chara contraria, *Lemna minor, *Fucus vesiculosus, Macrophytes, Ash, Salt marshes, Shores, Ponds, Swamps, Aquatic plants, Detritus, Food chains, Duckweed, Organic matter.

In an effor to study in-situ changes in quantity and quality of dead plant material in small lentic freshwater and rocky shore marine environments, ash, organic carbon, and total nitrogen content were determined for the aquatic macrophytes Chara contraria, Lemna minor, and Fucus vesiculosus, both fresh and after decomposition, in both kinds of habitat. Chara was studied in a small freshwater pond and Lemna in a shallow swamp over 70 days of in-situ decomposition, and Fucus was examined over a 63-day period in a rocky shore area and in a salt marsh. Chara showed a progressive decrease in carbon and an increase in nitrogen, while Lemna increased in carbon and decreased in nitrogen (ash-free dry weight). Although the Chara carbon:nitrogen ratio was initially high and that of Lemna relatively low, C:N after decomposition was nearly the same for both. In the salt marsh, Fucus decomposition produced no significant change in carbon, but an increase in nitrogen. On the rocky shore, decompostion decreased carbon and increased nitrogen. Much of the initial total dry weight loss during submergence is attributable to solubilization of ash and of some high C:N ratio organic material. Accumulation of a high proportion of autotrophic microbial biomass (such as purple sulfur bacteria) in the structural carbohydrates of the salt marsh Fucus may have caused observed

differences in C:N of the decomposing Fucus. Data suggest that initial differences in nutritional value of aquatic macrophytes diminish during decompostion, and the ultimate C:N may be more dependent on decomposer organisms than on type of organic material. (Lunch Wisconsin)
W79-00571

EFFECT OF THE CONCENTRATION OF NITROGEN COMPOUNDS ON MICROBIAL REDUCTION OF SULPHATES,
Adam Mickiewicz Univ., Poznan (Poland). Inst. of Chemistry.
F. Domka, and J. Sasiorek.
Acta Microbiolgica Polonica, Vol. 7, No. 4, 1975, p 259-262. 3 fig, 1 tab, 6 ref.

Descriptors: *Sulfates, *Reduction(Chemical), *Desulfovibrio desulphuricans, *Microorganisms, *Nitrogen, *Sulfur, Nitrogen-sulfur ratio, Sulfides, Carbon.

In tests of microbial sulfate reduction by Desulfovibrio desulphuricans, a change in the nitrogen:sulfur ratio in the reaction medium affected the degree of reduction of sulfates to sulfides. In previous investigations of such reduction by the present authors, effects of temperature, pH and carbon:sulfur ratio had been studies. Optimal reduction conditions were at an N:S ratio of 0.33. The time interval between the initial and log phase of the process was also dependent on the N:S ratio. Five media closely resembling Starkey's medium with varying N:S ratios (mg/20 ml) of 0.19, 0.33, 0.48, 0.63, and 1.22 were used in the experiments. All experiments were conducted at 33 C in Polezajev bottles; pH was maintained at 6.8. The carbon:sulfur ratio was held constant at 1.84, determined in a previous study to be optimal. Results indicate that for microbial reduction of sulfates to sulfides on an industrial scale, an adequate supply of utilizable nitrogen is required to assure optimal reduction conditions. (Lynch-Wisconsin)
W79-00572

DEGRADATION OF UREA BY BACTERIA AND ALGAE IN MASS ALGAL CULTURES,
Warsaw Univ. (Poland), Dept. of Environmental Microbiology.
For primary bibliographic entry see Field 5D.
W79-00573

A MODEL OF RENEWABLE RESOURCES AND LIMITATION OF DEPOSIT-FEEDING *BENTHIC POPULATIONS*,
State Univ. of New York at Stony Brook. Dept. of Ecology and Evolution.
J. S. Levinton, and G. R. Lopez.
Oecologia, Vol. 31, No. 2, 1977, p 177-190. 6 fig, 1 tab, 32 ref.

Descriptors: *Hydrobia minuta, *Mathematical models, *Deposit feeders, *Limiting factors, *Renewable resources, *Fecal pellets, *Benthic fauna, Hydrobia ventrosa, Snails, Gastropods, Equilibrium, Model studies, Coprophagy, Food habits, Mud snails, Flax Pond(NY), New York, Denmark, Ponds, Lagoons, Sedimentation, Sediments, Carrying capacity.

A model is developed for resource renewal, geared to the deposit of feeding mud snails, Hydrobia minuta and H. ventrosa; additionally, a logistic model of recovery is proposed for living resources that are themselves limited by nutrients or space. The models are used to predict carrying capacities of Hydrobia; the renewal rate of resources exploited by a population influences carrying capacity and competitive interaction. Benthic animals such as Hydrobia which feed on deposits ingest sedimentary particles and organic debris, assimilate attendant microorganisms, and egest fecal pellets. Following egestion, the fecal pellets are recolonized by microorganisms, and again become a food source for deposit feeders. H. ventrosa would not ingest fecal pellets until they had broken down into component particles and debris, apparently an adaptive mechanism to ensure that ingested material has had sufficient time to be recolonized. Pellet breakdown rate is thus concluded to be an important limiting factor, and pellet breakdown is regarded as the renewable resource. Population densities predicted by the pellet breakdown model were in the general range of those measured for Hydrobia populations in the field. Hydrobia minuta specimens were collected from Flax Pond, New York, and specimens were collected from Flax Pond, New York, and specimens of H. ventrosa from a pond and lagoon in Denmark. In the resource renewal model, resource is always available if the fraction exploited per day is less than one minus the fraction remaining per day. (Lynch-Wisconsin)
W79-00575

ACID LAKE RENOVATION,
Peabody Coal Co., Central City, KY. Regional Lab.
For primary bibliographic entry see Field 5G.
W79-00576

LIMNOLOGICAL STUDY OF THE CHICA DE SAN PEDRO, LA POSADA AND LO MENDEZ LAGOONS: II. QUANTITATIVE ASPECTS OF WINTER PLANKTON AND ITS RELATION TO PHYSICAL AND CHEMICAL ASPECTS OF THE ENVIRONMENT (IN SPANISH),
Concepcion Univ. (Chile). Dept. of Botany.
V. Dellarossa, E. Ugarte, and O. O. Parra.
Bol Soc Biol Concepcion 50, p 87-102, 1976.

Descriptors: *Eutrophication, *Phytoplankton, Lagoons, *Chile, Water pollution effects, Oligotrophy.

Winter studies of 3 lagoons in the region of Concepcion, Chile, were made. Physical and chemical conditions were correlated with qualitative and quantitative features of the phytoplankton. The results indicated eutrophication in Lo Mendez lagoon and oligotrophy in La Posada and Chica de San Pedro lagoons.—Copyright 1978, Biological Abstracts, Inc.
W79-00577

CADMIUM ACCUMULATION BY THE *MARINE RED ALGA PORPHYRA UMBILICALIS*,
Aberdeen Univ. (Scotland). Dept. of Biochemistry.
M. W. McLean, and F. B. Williamson.
Physiologia Plantarum, Vol. 41, No. 4, 1977, p 268-272. 9 fig, 25 ref.

Descriptors: *Cadmium, *Zinc, *Porphyra umbilicalis, *Bioaccumulation, *Light, *Equilibrium, Heavy metals, Algae, Rhodophyta, Marine algae, Absorption, Hydrogen ion concentration, Darkness, Photosynthesis, Proteins, Cycloheximide, Autoradiography, Pollutants, Anabolism, Kinetics.

Cadmium accumulation by the marine red alga Porphyra umbilicalis under various light conditions was found to result from an ongoing anabolic process, and not the consequence of a pH gradient as provided by photosynthesis. Use of the protein synthesis inhibitor cycloheximide reinforced this conclusion, demonstrating that de novo protein synthesis is a prerequisite for cadmium accumulation. Autoradiographs show a specific intracellular location for bound cadmium, apparently the nucleus. Cadmium does not behave like zinc in several respects: (1) Light is essential for sustained cadmium accumulation, while zinc uptake is similar in light and darkness, despite reports that it is light-dependent. (2) The lag period before light stimulation occurs is much longer for cadmium (about 30 hrs) than for zinc (under one hr). (3) pH has a decisive effect on zinc accumulation. (4) Regarding uptake kinetics, zinc equilibrium is attained in only about 35 hrs in both light and darkness. Kinetics are initially first order with respect to plant mass, and rapidly approach equilibrium, with a final concentration factor of 255 reported. In contrast, a steady state for cadmium was only obtained in darkness or with cycloheximide; equilibrium was never achieved in the light even after 600 hrs and accumulation rate was directly proportional to plant mass, with metal concentration in solution not being significantly affected. (Lynch-Wisconsin)
W79-00578

DIFFERENCES IN PRODUCTIVITIES BETWEEN THE GREAT AUSTRALIAN BIGHT AND THE GULF OF CARPENTARIA, AUSTRALIA, IN SUMMER,
Hokkaido Univ., Hakodate (Japan). Faculty of Fisheries.
S. Motoda, T. Kawamura, and A. Taniguchi.
Marine Biology, Vol. 46, No. 2, 1978, p 93-99. 5 fig, 1 tab, 14 ref.

Descriptors: *Great Australian Bight, *Gulf of Carpentaria(Australia), *Phytoplankton, *Zooplankton, *Productivity, *Nutrients, *Bays, *Gulfs, Australia, Standing crops, Chlorophyll, Primary productivity, Biomass, Species composition, Algae.

Phytoplankton standing crop and primary productivity, along with zooplankton biomass, were much higher in Australia's Gulf of Carpentaria (north coast) than in the Great Australian Bight (south coast) as recorded on cruises in December 1965 (Great Australian Bight) and December 1968 (Gulf of Carpentaria). The unexpectedly low values for the bight are attributable to lack of nutrient replenishment from land or upwelling of deep water. Average phytoplankton standing crop was 27.3 mg chlorophyll-a/sq m in the gulf and 12.1 mg in the bight, average primary productivity was 133.1 mg C/sq m/hr in the gulf and 18.2 mg in the bight, and average zooplankton biomass was 305.3 mg wet wt/cu m in the gulf and 7.1 mg in the bight. Vertical stratification, which generally prevents nutrient replenishment in the euphotic layer, was weak in the bight despite low productivity. The bight's wide opening to the ocean probably induces vertical mixing due to oceanic currents. Transparency in the bight is low, apparently due to inorganic suspensions, and the result is a shallow euphotic layer. Bight water becomes progressively nutrient-depleted closer to the coast. On the other hand, the Gulf of Carpentaria is enriched by land drainage and inflow of originally nutrient-rich water from adjoining sea areas. Gulf water is neritic, as indicated by phytoplankton composition. (Lynch-Wisconsin)
W79-00579

PARTICULARATE ORGANIC MATTER IN *SURFACE WATERS OFF SOUTHERN* CALIFORNIA AND ITS RELATIONSHIP TO PHYTOPLANKTON,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
R. W. Eppley, W. G. Harrison, S. W. Chisholm, *and E. Stewart.*
Journal of Marine Research, Vol. 35, No. 4, November 1977, p 671-696. 7 fig, 4 tab, 55 ref.

Descriptors: *Phytoplankton, *Organic matter, *Southern California Bight, *Particulates, *Surface waters, Algae, California, Oceans, Bays, Euphotic zone, Carbon, Nitrogen, Chlorophyll, Adenosine triphosphate, Zooplankton, Particle size, Abundance, Standing crops, Eutrophication, Food webs.

Distribution and quantitative relationships among several biochemical parameters were studied during six cruises (September 1974-March 1976) in the *Southern California Bight to estimate the relative*

contributions of plankton to total particulate organic matter. Each parameter correlated with the others, suggesting that plankton (especially phytoplankton) contributed significantly to total particulate organic matter and was dynamically related to the total. Particulate carbon, nitrogen, chlorophyll-a, adenosine triphosphate (ATP), particle count, and particle volume were measured in the euphotic zone. Particle volume and number, as determined with a Coulter Counter, apparently measured both living and nonliving organic particulates well. Phytoplankton carbon accounted for an increasing proportion of total particulate carbon as the latter increased. Seasonal changes in estimated phytoplankton carbon: chlorophyll-a ratio paralleled changes in the photosynthetic assimilation ratio accompanying seasonal changes in temperature and irradiance. Sampling of diatom and dinoflagellate blooms permitted approximate determinations of carbon, nitrogen, ATP, and chlorophyll-a per particle, and the size of dominant organisms and species mixtures. The lifetime of total particulate matter in the euphotic zone, if none were refractory, was apparently only about 1-2 weeks, and its chemical composition resembled that of plankton. (Lynch-Wisconsin)
W79-00581

ALTERATION OF SWAMP FORESTS UNDER THE EFFECT OF DRAINAGE (IN RUSSIAN),
T. K. Kapustinskaite.
Lesovedenie (4) p 18-28, 1977.

Descriptors: *Drainage, *Oligotrophy, Swamps, *Swamp forests, Water pollution, *Mesotrophy, *Lithuania, *Oxalis-acetosella, Soils, Succession, USSR, *Vaccinium-myrtillus.

In the Lithuanian SSR (USSR) swamp forest biogeocenoses become stable not earlier than 20-25 yr after draining. On peaty soils of former oligotropic swamps, drained 30-40 yr ago, in place of Pinetum sphagnosum and p. iedosum of low quality V-V(a) quality class) Pinetum iedoso-pleuro-ziosium of IV-II quality class are are formed. On the areas of mesotrophic swamps. Pinetum cariscoso-sphagnosum, Piceetum caricoso-sphagnosum and Betuletum caricoso-sphagnosum of IV-V quality class give place to highly productive (II-I) forests with cover of Vaccinium myrtillus and Oxalis acetosella L. In place of medium productive Glutinosae Alnetum caricosum and Betuletum caricosum growing on soils of marshes, highly productive Glutinosae Alnetum caricoso-mixoherbosum and Betuletum caricoso-mixoherbosum arise. Forest phytocenoses on extremely poor soils of bogs and on rich soils of marshes change little under the influence of drainage.--Copyright 1978, Biological Abstracts, Inc.
W79-00585

***PIGMENT DIVERSITY IN FRESHWATER* PHYTOPLANKTON. II. SUMMER-SUCCESSION IN THREE DUTCH LAKES WITH DIFFERENT TROPHIC CHARACTERISTICS,**
Amsterdam Univ. (Netherlands). Limnological Lab.
G. M. Hallegraeff.
Internationale Revue Der Gesamten Hydrobiologie, Vol. 62, No. 1, 1977, p 19-39. 4 fig, 3 tab, 32 ref.

Descriptors: *Pigments, *Phytoplankton, *Succession, *Trophic level, *Chromatography, *Lakes, *Analytical techniques, Netherlands, Pool t' Hammetje(Neth.), Barlosche Kolk(Neth.), Lake Maarsseveen(Neth.), Algae, Summer, Eutrophication, Chloroplasts, Chlorophyll, Floral lists, Spectrophotometry, Carotenoids, Methodology, Margalef pigment ratio.

Spectrophotometric and paper chromatographic analyses were made of chloroplast pigments in the phytoplankton of three Dutch freshwater lakes of widely different trophic characteristics during spring and summer 1973-75 to test Margalef's pigment ratio and pigment diversity propositions as indicators of changing phytoplankton physiological state and taxonomic composition. It is concluded that pigment ratios and carotenoid:chlorophyll-a ratios are inaccurate and insensitive pigement characteristics, and that in the description of diversity of pigments there is no alternative to chromatographic analysis. The chromatographically purified chlorophyll-a fraction, together with the occurrence of breakdown products of chlorophyll-a give valuable information on the stage of growth of phytoplankton populations. The pigment fractions fucoxanthin, peridinin, lutein and/or chlorophyll-b, and myxoxanthophyll can be used to indicate the contribution of the different major algal types to total phytophankton community pigments. In this way chromatographic pigment analysis may be an important tool in the description of phytoplankton community structure, particularly when used with results of microscopic phytoplankton analysis. The lakes studied, in order of decreasing lake fertility, were Pool 't Hammetje, Barlosche Kolk, and Lake Maarsseveen. (Lynch-Wisconsin)
W79-00595

ALGAE OF BIOLOGICAL PONDS OF THE CHERKASSY CHEMICAL INDUSTRY (IN UKRANIAN),
Cherkasskii Pedagogical Inst. (USSR). Div. of Botany.
H. P. Oliinyk.
Ukr Bot Zh 34(1), p 39-42, 1977.

Descriptors: *Algae, *Ponds, *Industrial wastes, *Phytoplankton, *Chemical wastes, Chemical industries, Ecology, *Scenedesmus, *Ukrainian-SSR, USSR.

Studies were conducted in phytoplankton of biological ponds of the Cherkassy chemical enterprises, (Ukrainian SSR, USSR). Found were 83 taxons in the species and intraspecies rank which belonged to 5 sections of alga. Scenedesmus quadricauda (Turp.) Breb. and S. acuminatus (Lagerh). Chod. developed in mass, almost without mixtures of other algae. Contrary to the biological ponds described in literature, this pond was characterized by a relatively small species variety, explained by constant environmental conditions.--Copyright 1978, Biological Abstracts, Inc.
W79-00611

A METHOD FOR ESTIMATING THE *REGIONAL EFFECTS OF LAND USE ON RIVER*-WATER QUALITY, SUSQUEHANNA RIVER BASIN, PENNSYLVANIA AND NEW YORK,
Geological Survey, Portland, OR. Water Resources Div.
D. J. Lystrom, and F. A. Rinella.
In: Proceedings of the 4th Joint Conference on Sensing of Environmental Pollutants, held in New Orleans, Louisiana, November 6-11, 1977: *American Chemical Society*, p 732-738, 1978. 3 fig, 2 tab, 16 ref.

Descriptors: *Model studies, *Regression analysis, *Water quality, *Drainage area, *Geomorphology, Land use, Sediments, Suspended load, Climatology, Streamflow, Flow characteristics, Topography, Soils, Equations, Analytical techniques, New York, Pennsylvania, *Susquehanna River basin.

This paper presents a framework for compiling available data for assessing statistical relationships between water quality and several factors of climate, physiography, and land use. Eleven water-quality properties were compiled for 85 subbasins of the Susquehanna River basin in Pennsylvania and New York. Water-quality properties are calculated loads or mean concentrations of suspended sediment, dissolved solids and various chemical species of nitrogen and phosphorus. Up to 57 basin characteristics were compiled for each of the 85 subbasins from available data sources. These characteristics represent six general categories: (1) climate, (2) topography, (3) geology, (4) soils, (5) streamflow, and (6) land use. Multiple linear regression equations were developed relating water-quality properties to basin characteristics. Usable regression equations were defined for 10 of the 11 water-quality properties. These equations explain from 58 to 89 percent of the variation of the water-quality properties, with standard errors of estimate ranging from 17 to 75 percent. The 10 equations can be used to estimate water quality at specific stream sites or to simulate the generalized effect of a specific basin characteristic, such as land use, on water quality. (Woodard-USGS)
W79-00622

SCHISTOSOMIASIS DISTRIBUTION IN THE YEMEN ARAB REPUBLIC (IN RUSSIAN),
Volgogradskii Gosudarstvennyi Meditsinskii Inst. (USSR). Div. of Biology.
N. V. Bel'gesov, and G. R. Yarulin.
Med Parazitol Bolezn 45(4), p 403-404, 1976.

Descriptors: Biomphalaria-sp, Bulinus-sp, *Distribution, *Human diseases, Pathology, *Schistosomiasis, Uro, *Yemen Arab Republic.

Studies of intestinal and urogenital schistosomiasis distribution in the 6 provinces of Yemen indicate that while both forms are found in all provinces, the urogenita form is more common in the north and the intestinal form more common in the southern mountains. Less extensive invasion of both forms was observed in the coastal region. A study of 669 women in the San'a area revealed 4.7% with urogenital and 3% with intestinal schistosomiasis. More frequent invasion of men may be due to involvement in all aspects of irrigation and close contact with water. A test of 1518 Biomphalaria and Bulinus mollusks from natural water and reservoirs in the vicinity of San'a revealed that 171 (11.26%) of the specimens were hosting schistosome cercaria.--Copyright 1977, Biological Abstracts, Inc.
W79-00633

ASSESSING THE SOCIAL IMPACTS OF OIL SPILLS. PROCEEDINGS OF AN INVITA*TIONAL SYMPOSIUM.*
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 5G.
W79-00661

THE CHEMICAL COMPOSITION AND HYDROCHEMICAL REGIME OF THE WATER IN LAKE VIITNA LINAJARV (IN ESTONIAN),
Akademiya Nauk Estonskoi SSR, Tartu. Inst. of Zoology and Botany.
H. Simm, H. Starast, U. Malgi, and A. Lindpere.
Eesti Nsv Tead Akad Toim 24(4), p 295-308, 1975.

Descriptors: *Lake Viitna Linajarv(USSR), *Hydrochemistry, *Lakes, Color, Conifers, Forests, Gas regime, Macrophytes, Minerals, Phytoplankton, Soil, Water pollution effects.

Lake Viitna Linajarv is a seepage lake situated in a sandy area covered with coniferous forests. The lake feeds on phreatic water whose chemical composition is formed by the percolation of precipitation water through soil poor in organic substances and carbonates. The formation of the chemical composition of water has been influenced strongly by autochthonous factors, such as the copious occurrence of water vegetation, especially phytoplankton, and bottom mud which accumulated due to the decaying of macrophytes and phytoplankton. Human activity has induced the plant growth and the mud accumulation. The water color, the mineral dynamics and the gas regime in the lake have changed.--Copyright 1978, Biological Abstracts, Inc.
W79-00662

ICHTHYOLOGICAL AND HYDROLOGICAL OBSERVATIONS AND STUDIES ON YARINA COCHA, NEAR PUCALLPA AND ON THE RIO PACAYA (CENTRAL AND LOWER UCAYALI, E PERU), (IN GERMAN),
Zoologisches Forschungsinstitut und Museum 'Alexander Koenig, Bonn (West Germany).
K. H. Lueling.
Zool Beitr 21(1), p 29-96, 1975.

Descriptors: Water analysis, Eutrophication, Water pollution effects, Anabaena, Chironomus, Fish, *Hydrological studies, *Ichthyological studies, Microcystis, Oscillator, Pacaya, *Peru, Phytoplankton, Pucallpa, *Rio, Ucayali(Peru), *Yarina Cocha.

The biological-hydrographical conditions of the Yarina Cocha, situated in Peru, and its fish stock are discussed. A complete water analysis characteristic of the time of floods is included. During low water (in which the lake is separated from the river Ucayali) the water of the Cocha is of a greenish-dark grey color, sometimes with a tinge of greenish-blue, depending on the development of Microcystis, Anabena and Oscillatoria. Swarms of mosquitoes of the genus Chironomus are found above the water of the Cocha and its banks, particularly during the time of low water. At the end of July and during Aug. regular fluorescence of the water occurs due to a bloom of phytoplankton.--Copyright 1977, Biological Abstracts, Inc.
W79-00668

EFFECTS OF A COASTAL FRONT ON THE DISTRIBUTION OF CHLOROPHYLL IN LAKE TAHOE, CALIFORNIA-NEVADA,
California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 5B.
W79-00699

ANALYSES OF AROMATIC HYDROCARBONS IN INTERTIDAL SEDIMENTS RESULTING FROM TWO SPILLS OF NO. 2 FUEL OIL IN BUZZARDS BAY, MASSACHUSETTS,
Woods Hole Oceanographic Institution, MA. Dept. of Biology; and Woods Hole Oceanographic Institution, MA. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W79-00719

LONG-TERM FATE OF A HEAVY FUEL OIL IN A SPILL-CONTAMINATED B.C. COASTAL BAY,
Institute of Ocean Sciences, Sidney (British Columbia).
W. J. Cretney, C. S. Wong, D. R. Green, and C. A. Bawden.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 521-527, May 1978. 4 fig, 2 tab, 14 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Oil spills, *Biodegradation, Water pollution effects, Environmental effects, Intertidal areas, *Outer Continental Shelf, British Columbia, Fuel oil, Petroleum hydrocarbons.

The fate of accidently spilled No. 5 fuel oil in a small coastal bay in British Columbia was observed 6 times during 4 years. The oil's composition was first changed by loss of the lower molecular weight components by evaporation and dissolution. Biodegradation accounted for almost complete removal of n-alkanes in the 1st year. Pristane and phytane were biodegraded more slowly, but were almost completely gone in 4 years. The non-n-alkane components in the nC28-36 range seem to be the most resistant to degradation of all the components resolved in the gas chromatograms. The resistance to degradation of these components indicates their potential for long-term studies of oil spills. (Sinha-OEIS)
W79-00720

RESIDUES OF BUNKER C OIL IN CHEDABUCTO BAY, NOVA SCOTIA, 6 YEARS AFTER THE ARROW SPILL,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 5A.
W79-00721

CONTRIBUTION OF CHRONIC PETROLEUM INPUTS TO NARRAGANSETT BAY AND RHODE ISLAND SOUND SEDIMENTS,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5A.
W79-00722

PRELIMINARY ASSESSMENT OF THE PRESENCE OF OIL IN THE ECOSYSTEM AT EKOFISK AFTER THE BLOWOUT, APRIL 22-30, 1977,
Torry Research Station, Aberdeen (Scotland).
P. R. Mackie, R. Hardy, and K. J. Whittle.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 544-551, May 1978. 4 fig, 6 tab, 19 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Water pollution effects, *Ecosystems, *Oil pollution, Environmental effects, *Outer Continental Shelf, North Sea, Platform Bravo, Hydrocarbons.

The marine environment in the Ekofisk area was assayed for the presence of oil components after the blowout on Platform Bravo was brought under control. Several methods of assay were used but the results were not always strictly comparable. Relatively high fluorescence values were observed in water samples in the vicinity of the platform. However, gas-liquid chromatography of these samples indicated that although some of the hydrocarbon fractions now resembled crude oil, none had increased markedly in concentration. The presence of oil could be detected in the biota and taste panels were able to identify an oily taint at low level in some fish caught near the platform. A second survey some 2 mo after the spill indicated that little, if any, oil from the blowout remained in the water column. (Sinha-OEIS)
W79-00723

WEATHERING CHARACTERISTICS OF PETROLEUM HYDROCARBONS DEPOSITED IN FINE CLAY MARINE SEDIMENTS, SEARSPORT, MAINE,
Bowdoin Coll., Brunswick, ME. Dept. of Chemistry; and Bigelow Lab. for Ocean Sciences, Boothbay Harbor, ME.
D. W. Mayo, D. S. Page, J. Cooley, E. Sorenson, and F. Bradley.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 552-562, May 1978. 20 fig, 2 tab, 7 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Sediments, *Oil spills, *Environmental effects, *Weathering, Water pollution effects, Clays, Clams, Maine, *Outer Continental Shelf, Petroleum hydrocarbons, Mya arenaria.

Further examination of the 1971 spill site in Long Cove, Searsport, Maine, has been carried out during 1976, and has led to the following observations: (1) Petroleum residues isolated from this spill give the appearance of weathering particularly slowly in the cold anoxic sediments of Long Cove. (2) Leaching from contaminated terrestrial sediments onto portions of the intertidal zone on the west shore of the Cove while continuing in trace concentrations does not appear to be making a major contribution to the maintenance of a nearly steady state pollution problem found in several areas of the Cove. (3) On the average, the spill area currently appears to contain roughly 20% less material than in 1971. At a number of sites, however, there appears to have been either little or no decline in gross hydrocarbon concentrations, and essentially no weathering of the aliphatic portions of the petroleum residues. (4) One of the principal factors to influence the character of petroleum residues isolated 5 yr postspill appears to have been the weathering of the hydrocarbons during transport to the site of sediment penetration from upland locations. Thus, the current distribution was determined early in the spill period. (5) Repopulation of the Cove by M. arenaria, which is proceeding very slowly, correlates directly with the gross concentration variations of petroleum hydrocarbons. (Sinha-OEIS)
W79-00724

MECHANICAL DISPERSAL OF OIL STRANDED IN THE LITTORAL ZONE,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 5G.
W79-00725

UPTAKE OF HYDROCARBONS FROM MARINE SEDIMENTS CONTAMINATED WITH PRUDHOE BAY CRUDE OIL: INFLUENCE OF FEEDING TYPE OF TEST SPECIES AND AVAILABILITY OF POLYCYCLIC AROMATIC HYDROCARBONS,
Battelle Pacific Northwest Labs. Sequim, WA, Marine Research Lab.
G. Roesijadi, J. W. Anderson, and J. W. Blaylock.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 608-614, May 1978. 1 fig, 3 tab, 22 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Oil pollution, *Sediments, *Arctic, Benthos, Environmental effects, Water pollution effects, *Outer Continental Shelf, *Hydrocarbons, *Aromatic hydrocarbons, Petroleum hydrocarbons, Deposit feeders, Test species, Macoma inquinata, Phascolosoma, Protothaca.

Selected benthic animals were exposed to marine sediments contaminated with Prudhoe Bay crude oil, and uptake of hydrocarbons was monitored under various experimental schemes. When uptake of aliphatic and diaromatic hydrocarbons by two deposit feeders, Macoma inquinata and Phascolosoma agassizii, was compared with that of a suspension feeders, protothaca staminea, it was found that the deposit feeders generally accumulated hydrocarbons to a greater extent than the suspension feeder. However, other factors, such as the intrinsic capabilities of species to accumulate hydrocarbons, also played an important role in the extend of contamination. Hydrocarbon concentations in the bivalve species (M. inquinata and P. staminea) increased during the 60-day exposure period; whereas concentrations in the sipunculid Phascolosoma agassizii appeared to have reached an equilibrium relatively early in the exposure. Experiments on uptake of 14C-phenanthrene, -chrysene, -dimethylbenz (a) anthracene, and -benzo (a) pyrene by M. inquinata indicated that compounds directly associated with sediment were less available for uptake than those released from sediment to the surrounding seawater. Additionally, the heavier molecular weight aromatic compounds tended to be more concentrated in tissue and retained for longer periods of time than the lighter compounds. (Sinha - OEIS)
W79-00730

ECOLOGICAL AND PHYTOHISTORICAL INVESTIGATIONS OF LOWLAND BOG PLANT BIOTOPES OF OMBROTROPHIC BOG WITH SPECIAL RESPECT TO ITS POOLS AND LAKES IN NORTHWESTERN GERMANY, (IN GERMAN),
Kiel Univ. (West Germany). Botanisches Inst.
K. Mueller.
Beitr Biol Pflanz. 49(2), P 147-235, 1973.

Descriptors: Ammonium, *Biotopes, Bird, *Bogs, Bryophytes, Calcium, Carex-limosa, Dicots, Droppings, *Ecological, *Germany, Historical, Indicators, Lakes, Lowlands, Magnesium, Minerals, Monocots, Nitrates, *Studies, Ombrotrophic, Phosphates, Phytoplankton, Pools, Potassium, Pteridophytes, Sodium.

In ombrotrophic bogs fen plants only grow in certain habitats, especially in the region of flarks, soaks and pools. the main research was done in the well known mires of kAhlenmoor and Esterweger Dose/Westermoor, especially in and around the pools. The plants of 6 smaller pools are drawn on a map presenting the dominating pool carpet-Sphagna, the mineral soil water indicator plants as well as certain ombrominerabionta which concentrate here. It could be proved that the dynamics of succession in the Sphagnum carpets of the pools can be much greater than in full-growing hummock-holow complexes. Edaphic, hydrotopographic and microclimatic characteristics explain the conditions ofthe analysis of the vegetation in the region of fen plat habitats; the influence of animals on the mires was examined; furthermore pH, O2 content and the quantities of Na, Mg, K, Ca, P2O5, NH3 and NO3 in the water were analyzed and compared and were critically evaluated. The excrements of birds may cause an enrichment of N, P, andK by a maximum of 2 mg/l/yr. These results lead to a discussion of the occurrence of the bryophytes, pteridophytes, monocots and dicots found. Higher concentrations of nutritive substances in the waters lead to much richer growing but by no means are these concentrations necessary for the existence of the euminerobionta. Comparison with conditions of the other mires in the middle of Europe shows that, in interpreting the causes of the bog distribution, ranges of the ombrominerobionta as well as of the euminerobionta in ombrotorphic habitats regionally, the climate isthe most important.--Copyright 1974, Biological Abstracts, Inc.
W79-00732

ALTERATIONS IN GROWTH AND PHYSIOLOGY OF SOFT-SHELL CLAMS, MYA ARENARIA, CHRONICALLY OILED WITH BUNKER C FROM CHEDABUCTO BAY, NOVA SCOTIA, 1970-76,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.
E. S. Gilfillan, and J. H. Vandermeulen.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 630-636, May 1978. 4 fig, 3 tab, 21 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Water pollution effects, *Environmental effects, *Clams, *Oil spills, Oil pollution, Growth, Physiology, *Outer Continental Shelf, Nova Scotia, Mya arenaria, Petroleum, Bunker C oil.

Two populations of soft-shell clam, Mya arenaria, one from a chronically oiled lagoon (since the Arrow oil spill in 1970) and the other from a nonoiled lagoon, were compared as to population structure, growth, and metabolism. The oiled lagoon sediments contained up to 3800 micro g/g oil (UV determination), and clams up to 200 micro g/g hydrocarbon in their tissues (fluorescence). The oiled population of clams differed from the nonoiled population in lower total numbers with fewer mature adults, a 1-2-yr lag in tissue growth, a lower shell growth rate, and a reduced carbon flux with a lower assimilation rate. Results are interpreted to indicate that the recovery potential of M. arenaria in these oiled sediments is low and that these oiled populations remain under continued stress 6 years after the Arrow spill. (Sinha-OEIS)
W79-00733

STUDIES ON A SALINE LAKE ECOSYSTEM,
Australian National Univ., Canberra. Dept. of Environmental Biology.
For primary bibliographic entry see Field 2H.
W79-00734

STRUCTURE AND DYNAMICS OF THE FRENCH UPPER RHONE ECOSYSTEMS: II. HYDROLOGICAL AND ECOLOGICAL STUDY OF SOME BACKWATERS: FIRST RESULTS (IN FRENCH),
Lyon-I Univ., Villeurbanne (France). Dept. de Biologie Animaux et Zoologie.
J. Juget, C. Amoros, D. Gamulin, J. L. Reygrobellet, and M. Richardot.
Bull Ecol 7(4), p 479-492. 1976.

Descriptors: *Eutrophication, Waste waters(Pollution), Ecosystems, *France, Water pollution effects, Rivers, *Rhone River.

As a contribution to the general study of the French upper Rhone ecosystems, the morphometric and hydrologic characters of 2 ancient arms of the river, the Lone des Pecheurs and the Grande Lone, near Jons-Villette d'Anthon, below the point where the Rhone receives the Ain river were studied. These ancient arms or lones are silting up and are unstable, aquatic ecosystems. The more recent Lone des Pecheurs, is still connected with the main river and is influenced both by the varying level of the former and by the discharges from the phreactic waters. The border effect appears in the form of upstream to downstream gradients the sign and the amplitude of which depend on the nature of the parameters considered. The Grande Lone, now cut off from the main stream, has become very eutrophic, this character being enhanced by wastewater discharge.--Copyright 1978, Biological Abstracts, Inc.
W79-00735

BACTERIOLOGICAL INVESTIGATIONS OF SEA WATER ALONG THE DUTCH COAST: 1971 AND 1972, (IN GERMAN),
Rijksinstituut voor de Volks gezondheid, Bilthoven (Netherlands). Lab for Zoonosen Lebensmittelmikrobiology.
E. H. Kampelmacher, A. W. Fonds, and L. M. Van Noorle Jansen.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. 157(4), p 313-327, 1973.

Descriptors: Aan, *Bacteriological studies, Bathers, Chlorides, Coasts, Coliforms, Dutch, E. coli, Frisian, Ijmuiden, Islands, Katwijk, Netherlands, Noordwijk, Salmonella, Scheveningen, *Sea water, Sewage, Streptococci, Wind, Zee.

The bacteriological quality of the sea water along the Dutch coast can be said to be good, apart from a few exceptions. In a large part of the area investigated, not more than 1 Escherichia coli/ml is found. In areas with a poorer bacteriological quality of sea water, this is due to the introduction of unpurified sewage. This is especially true of the Katwijk aan Zee and Scheveningen areas (the Netherlands). When the wind blows from the south westerly direction, there is a marked increase in the impurities. In addition to the introduction of sewage already mentioned, which was greatly reduced since 1971 due to various measures, the outlets of the great rivers, which are loaded with sewage also make an important contribution. The results of the samples from the Frisian Islands and the greater part of the southern area turned out to be extraordinarily favorable. The investigations have also clearly emphasized that the bacteriological conditions of the sea water is not affected by the number of bathers. In comparison with investigations made in 1970, it is striking that the results in 1971 are much better as regards fecal contamination. From the chloride determinations it appears that another type of weather was probably involved, the 'damming up' of fresh water of the coast occurring only to a slight extent. In addition the introduction of unpurified sewage was and is being reduced, especially at Katwiik aan Zee (the mouth of the 'Old Rhine') and Scheveningen to an increasing extent. Although the area sampled was much smaller, the results for 1972 are also favorable with the exception of inner Ijmuiden. The high levels of E. coli found here were to be anticipated in connection with the outlet of the North Sea Canal. Moreover, this area has no importance as a bathing beach. The results of the investigation at Noordwiik are more unfavourable in 1972 than for 1971. The chloride content of the water also fluctuated less. Since the chloride content is only to be considered an additional determination, it follows that the highest MPN (most probable number) at Noordwijk (3.7.72) does not coincide with the lowest chloride content (10.4.72). The absence of Salmonella emphasizes that infections with these organisms while bathing or swimming in the sea on the Dutch coast are still not to be feared.--Copyright 1974, Biological Abstracts, Inc.
W79-00737

SESTON AND SEDIMENT FORMATION IN FIVE LAKE DISTRICT LAKES,
Freshwater Biological Association, Ambleside (England).
W. Pennington.
J Ecol. 62(1), p 215-251, 1974.

Descriptors: Accumulation, Algae, Calcium, Carbon, Cesium-135, England, Eutrophication, Hypolimnion, Iodine, Lakes, Morphometry, Nitrogen, Postglacial, Potassium, *Productivity, *Sediments, *Seston.

Seston (total particulate matter in lake water) was collected in traps and measured over at least 1 annual cycle in 5 Lake District lakes (England), of contrasted morphometry and productivity. The organic fraction was estimated in all lakes, total N and I in 3, and in Blelham Tarn samples were analyzed monthly for C, N, I, K and Ca. The depth represented by the annual catch of seston was compared with the depth of the present annual increment to the sediments, as determined from distribution of fallout 137Cs (present in the atmosphere since 1954). Conclusions reached were: in shallow lakes resuspension and recirculation of once deposited material, particularly at the time of the autumn breakdown in stratification, resulted in seston catches of twice the volume of the permanent increment to the sediments, whereas in the deep lakes there was no significant difference between the volume of seston trapped and the annual increment; results of analysis of autumn seston from Blelham Tarn agreed with the postulated origin in resuspended material from the bottom; though in all lakes the present annual accumulation rate exceeds the mean post-glacial rate, this excess is significantly greater in the more productive lakes-those in which evidence for some degree of eutrophication within the last 2 centuries is present in the sediment profiles; comparison of composition of seston and sediment shows a higher percentage loss of organic matter from seston in those lakes in which the hypolimnion remains oxygenated throughout the year; and that these facts point to the survival into permanent sediment of organic matter from algal production in the 2 lakes which have become eutrophic-a situation which contrasts with that which has been present in Lake District lakes through most of post-glacial time.--Copyright 1974, Biological Abstracts, Inc.
W79-00738

INFLUENCE OF ENVIRONMENTAL CONTAMINATION ON CYTOCHROME P-450 MIXED-FUNCTION OXYGENASES IN FISH: IMPLICATIONS FOR RECOVERY IN THE WILD HARBOR MARSH,

Woods Hole Oceanographic Institution, MA. Dept. of Biology.
J. J. Stegeman.

Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p668-674, May 1978. 3 fig, 3 tab, 27 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environment's held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Oil spills, *Oil pollution, *Environmental effects, Marshes, Massachusetts, *Outer continental shelf, Petroleum hydrocarbons, Mummichog, Fundulus heteroclitus, Mixed-function oxygenases.

Levels of hepatic cytochrome P-450 and the catalytic functions benzo (a) pyrene hydroxylase and aminopyrine demethylase were significantly greater in populations of mummichog, Fundulus heteroclitus, sampled from contaminated marshes than in those fishfrom nearby reference marshes. Aminopyrene demthylase, but not benzo (a) pyrene hydroxylase, was also elevated in fish from one of the reference marshes. The levels of cytochrome P-450 and benzo (a) pyrene hydroxylase were highest in fish from the Wild Harbor, Marsh, site of the 1969 Florida spill. A correlation between size and benzo (a) pyrene hydroxylase activity ws identified in some of the populations studied, although influence by this factor did not mask the population differences. The results are consistent with the hypothesis that elevated levels of mixed-function oxygnase activity in fish from Wild Harbor are the result of oil spilled 8 yr ago, and that recovery of this marsh is not yet complete. (Sinha - OEIS)
W79-00739

OILED SEABIRD RESCUE AND CONSERVATION,

Newcastle upon Tyne Univ. (England) Dept. of Zoology.

For primary bibliographic entry see Field 5G.
W79-00740

RECOLONIZATION OF ROCKY SHORES IN CORNWALL AFTER USE OF TOXIC DISPERSANTS TO CLEAN UP THE TORREY CANYON SPILL,

Marine Biological Association ofthe United Kingdom, Plymouth (England). Plymouth Lab.
A. J. Southward, and E. C. Southward.

Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 682-706, May 1978. 21 fig, 2 tab, 132 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Oil spills, *Ecology, *Water pollution effects, *Environmental effects, Weathering, Algae, Intertidal areas, Toxicity, *Outer continental shelf, *Torrey Canyon, *United Kingdom, *Dispersants, *Recolonization, Rocky shores, Kuwait crude oil, Fucus, Entermorpha, Laminaria, Himanthalia.

Fourteen thousand tons of Kuwait crude oil, reduced from 18,000 tons by weathering at sea, was stranded along 150 km ofthe coast of West Cornwall, England, in March 1977. The oil was treated with 10,000 tons of toxic dispersants during cleaning operations. by itself the oil was not very toxic, although it kiled some limpets and barnacles, and most of the mortalities that followed cleaning were due to the dispersants. There was a graded effect. Most animals and some algae were killed on the shores treated heavily with dispersants, while a few animals and most algae survived in places less heavily treated. However, long stretches of coast were contaminated to some extent by drifting patches of oil and dispersants along the shore and by indiscriminate dispersants use in remote coves. The general sequence of recolonization was similar to that which has been found after small-scale experiments, where the rocks were scraped clean, or where limpets were removed, but took longer to complete. There was first a rapid 'greening' by the alga Enteromorpha; then a heavy settlement and growth of perennial brown algae (Fucus species), leading to loss of surviving barnacles. A settlement of limpets and other grazing animals followed, with eventual removal or loss of the brown alga. The final phases were a reduction in the lipet population and a resettlement of barnacles. lightly oiled, wave-beaten rocks that receie dlight dispersant treatment showed the most complete return to normal, taking about 5-8 yr; heabily oiled places that received repeated application of dispersants have taken 9-10 yr and may not be completely normal yet. (Sinha - OEIS)
W79-00741

COMPARISON OF OILED AND UNOILED INTERTIDAL COMMUNITIES IN CHEDABUCTO BAY, NOVA SCOTIA,

New Brunswick Univ., St. John. Div. of Sciences.
M. L. H. Thomas.

Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 707-716, May 1978. 3 fig, 9 tab, 23 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Oil pollution, *Water pollution effects, *Intertidal areas, Environmental effects, Clams, Sediments, Biota, *Outer Continental Shelf, Hydrocarbons, Nova Scotia, Mya arenaria, Littorina littorea, Petroleum hydrocarbons.

During 1976, detailed surveys of four oiled and four unoiled control stations, each subdivided into seven standardized intertidal levels, were carried out in Chedabucto Bay. Seventy-one species were found, 14 unique to control and 9 to oiled locations. Species diversity was uniformly higher at control than oiled stations. No differences in horizontal zonation of major species were apparent. Analysis of abundance and biomass data for the eight stations and seven tidal levels showed a significant overall difference between oiled and control situations. However, no particular station or tidal level was significantly different from any other. Ten species accounted for most of the variance between oiled and control stations. Six of these were more important at controls and four more important at oiled stations. The flora were particularly affected at oiled stations and species dominant on both sedimentary and rocky shores at all but the lowest tidal levels have been reduced. Length and weight data for the clam Mya arenaria showed significantly lower values at oil stations, but that for the periwinkle Littorina littorea showed the opposite. The length-weight relationship for both of these species showed a significantly lower increase in weight per unit of length at oiled than at control stations. Oiled stations showed significantly greater concentrations of oil in biota and sediments than unoiled, where concentrations were essentially at background levels. (Sinha-OEIS)
W79-00742

FLORIDA OIL SPILL IMPACT ON THE BUZZARDS BAY BENTHIC FAUNA: WEST FALMOUTH,

Woods Hole Oceanographic Institution, MA.
H. L. Sanders.

Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 717-730, May 1978. 18 fig, 3 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Oil spills, *Intertidal areas, *Water pollution effects, *Environmental effects, Statistics, Benthos, Massachusetts, *Outer Continental Shelf, *Petroleum hydrocarbons, Subtidal zone, Species composition, Buzzards Bay(Mass).

No matter what criterion is used to measure the effects of the Florida oil spill, the densities and species composition and the array of statistical methods demonstrate that the same hierarchical pattern emerges. Densities and species composition remain stable over time at the minimally oiled and unoiled stations, but display considerable fluctuations and marked changes at the more heavily oiled stations. With simple presence or absence data, highest fidelity is present at the marginally oiled stations, lower fidelity at the intermediately oiled stations, and lowest fidelity at the severely oiled stations. The discrepancy index measures mean yearly differences in faunal composition at each of the stations. Very large and large differences are documented for the severely and intermediately oiled stations but only small differences are found for the marginally oiled stations. The coefficient of variation is a measure of faunal variability throughout the entire sampling period for each of the stations. Faunal variation remains very high at the severely and intermediately oiled stations but low at the marginally oiled sites. Cluster analysis reveals profound temporal changes in the fauna from samples collected at the severely and intermediately oiled stations but demonstrates a much more homogeneous pattern with only small seasonal changes from samples obtained at the marginally oiled stations. (Sinha-OEIS)
W79-00743

NO. 2 FUEL OIL SPILL IN BOURNE, MASSACHUSETTS: IMMEDIATE ASSESSMENT OF THE EFFECTS ON MARINE INVERTEBRATES AND A 3-YEAR STUDY OF GROWTH AND RECOVERY OF A SALT MARSH,

Woods Hole Oceanographic Institution, MA; and Marine Biological Lab., Woods Hole, MA.
G. R. Hampson, and E. T. Moul.

Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 731-744, May 1978. 10 fig, 1 tab, 18 ref, append. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Oil pollution, *Salt marshes, *Ecology, *Oil spills, *Water pollution effects, *Environmental effects, Massachusetts, Invertebrates, Aquatic plants, Algae, *Outer Continental Shelf, Petroleum hydrocarbons.

On October 9, 1974 the oil barge Bouchard 65 loaded with 73,000 barrels of oil spilled what was initially thought by the Coast Guard to be a few barrels and later raised to an undetermined amount of No. 2 fuel oil off the west entrance of the Cape Cod Canal in Buzzards Bay, Massachusetts. Within the following 2-wk period, oil from the barge was found contained along the west side of Bassett's Island and inner Red Brook Harbor, a distance of 5.0 km from the site of the spillage. Qualitative samples of dead and moribund marine invertebrates were collected in tide pools and slight depressions along the beaches. A collection consisting of 4360 invertebrates comprising 105 species, plus 2 species of fish were found in 8 samples. Noticeable effects of the oil on the salt-marsh plant community were also observed. A detailed quantitative examination was begun to determine the effects of the oil on various components of the affected salt-marsh community in Winsor Cove compared to a selected control site. From the data collected in September 1977, the marsh grass in the lower intertidal zone in Winsor Cove has shown an inability to reestablish itself by either reseeding or rhizome growth. The associated sediments show a correspondingly high concentration of petroleum hydrocarbons impregnated in the peat substrate. Erosion rates measured in the af-

fected area, as a result of the 3-yr period of marsh degeneration, were 24 times greater than the control site. Microscopic algae were collected during the sampling period and those present were considered least sensitive to environmental changes. Examination of the interstitial fauna found in the study area in the summer of 1977 showed an extremely reduced number of individuals and species. (Sinha-OEIS)
W79-00744

LONG-TERM EFFECTS OF AN OIL SPILL ON FUCUS MACROFAUNA IN A SMALL BALTIC BAY,
Swedish Water and Air Pollution Research Lab., Nykoping. Baltic Sea Lab.
M. Notini.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 745-753, May 1978. 7 fig, 1 tab, 21 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Oil spills, *Water pollution effects, *Environmental effects, Benthos, Oil pollution, *Outer Continental Shelf, Petroleum hydrocarbon, Baltic Sea, Fucus vesiculosus, Mytilus edulis, Theodoxus fluviatilis, Gammarus, Iaera, Idotea.

On October 6, 1970, the small tanker Irini ran aground in the southern part of the Stockholm archipelago, releasing about 1000 t of medium and heavy fuel oil. Approximately 400 t drifted into a small bay, Gastiviken, wiping out nearly the entire littoral fauna. Most of the oil was collected mechanically during the winter, and by May 1971 cleanup operations were completed. The recruitment of the bladder wrack (Fucus vesiculosus) community in the bay was observed at intervals over a 5-year period. Significantly increased macrofauna population densities were found for a number of species in the 1974 and 1976 samples compared to those of 1971 and 1972. From June-July 1971 to June 1976, the mean numbers of individuals for all species rose. The bivalve Mytilus edulis increased in number from 0 to about 45, the gastropod Theodoxus fluviatilis from 0 to about 160, the amphipod Gammarus spp. from about 40 to 580, the isopods Idotea spp. from about 5 to 35, and Iaera spp. from almost 0 to about 10/100 g Fucus. Larvae of Chironomidae were the only group found with a decreased density between the first and sixth summers after the spill, with 240 and 145 individuals, respectively. The data obtained are discussed in relation to conditions in a nearby unpolluted bay and to normally occurring cyclic variations. (Sinha-OEIS)
W79-00745

OBSERVATIONS OF A COLD-WATER INTERTIDAL COMMUNITY AFTER 5 YEARS OF A LOW-LEVEL, PERSISTENT OIL SPILL FROM THE GENERAL M.C. MEIGS,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center; and Washington State Dept. of Ecology, Olympia.
R. C. Clark, Jr., B. G. Patten, and E. E. DeNike.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 754-765, May 1978. 9 fig, 2 tab, 18 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Oil spills, *Water pollution effects, *Environmental effects, Intertidal areas, Washington, *Outer Continental Shelf, Hydrocarbons, Petroleum hydrocarbons.

A rich and productive intertidal community was exposed continually for over 5 yr to small quantities of a Navy Special fuel oil from the unmanned troopship General M.C. Meigs that came aground on the Washington coast in January 1972. Observations of animal and plant populations and their petroleum hydrocarbon uptake patterns showed early evidence of contamination and the persistence of the oil spill throughout the study period. Abnormal and dead urchins, and loss of algal fronds and pigment were observed in localized areas near the wreck for at least 1 yr. Within 2 mo of the accident, paraffinic hydrocarbons had been taken up by prominent members of the community and continued to appear in certain species even after 5 yr. Although changes were seen in certain species during the early days of this persistent low-level pollution incident, the community balance in this rocky, intertidal ecosystem does not appear to have been markedly altered. (Sinha-OEIS)
W79-00746

RECOVERY OF BENTHIC MACROFAUNA FROM CHRONIC POLLUTION IN THE SEA AREA OFF A REFINERY PLANT, SOUTHWEST FINLAND,
Abo Akademi, Turko (Finland). Inst. of Biology; and Turku Univ. (Finland).
E. J. Leppakoski, and L. S. Lindstrom.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 766-775, May 1978. 10 fig, 3 tab, 38 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Water pollution effects, *Oil pollution, Environmental effects, Pollution abatement, Ecology, Benthos, Sediments, *Outer Continental Shelf, Baltic Sea, Finland, Species diversity, Recolonization, Chironomus plumosus.

Quantitative field studies (density, wet weight biomass, Shannon diversity, species richness, evenness of distribution) on benthic sublittoral macrofauna were made in the vicinity of an oil refinery in southwest Finland before and after the installation of a new wastewater treatment plant that reduced the amount of oil and liquid effluents. The number of species and species diversity increased during the 1st and 2nd year after pollution abatement at the stations close to the former outflows. The amphipods Pontoporeia affinis, Corophium volutator, and C. lacustre, midge larvae of the Chironomus plumosus-group, the oligochaete Tubifex costatus, the polychaetes Harmothoe sarsi and Polydora redeki, and the bivalve Cardium sp. were the most successful recolonizers of the 23 taxa sampled. The strong lethal effect of oil-contaminated sediments upon Chironomus plumosus larvae decreased markedly in laboratory experiments. Details of postabatement succession are discussed. The results demonstrate not only the recovery from chronic oil pollution but also the degree of ecological damage caused by previous continuous discharge of oil. (Sinha-OEIS)
W79-00747

STUDIES OF THE TOXICITY OF PHOSPHO-GYPSUM,
Gdansk Univ. (Poland). Biological Station at Gorki Wschodnie.
F. Pautsch, A. Bomirski, T. Dabrowska, and G. Drewa.
Pol Arch Hydrobiol 22(3), p 449-476, 1975.

Descriptors: *Toxicity, *Phospho-gypsum, *Phosphate fertilizers, *Vistula River(USSR), Amino-acids, Atp, Balanus-improvisus, Bay, Chlorophyll, Crangon-crangon, Embletonia-pallida, Embryo, Gammarus-sp, Gasterosteus-aculeatus, Gdansk, Hemolymph, Liver, Mitochondria, Nereis-diversicolor, Perch, Pike, Platichythys-flesus, *Poland, Rhithropanopeus-harrisi-tridentatus, Shrimp.

Phospho-gypsum (a waste product formed during the manufacture of phosphate fertilizers) added to water at concentrations of 2.59g/1-15 g/l caused within 3 days 100% mortality in the following species studied: Crangon crangon, Nereis diversicolor, Gasterosteus aculeatus, Rhitropanopeus harrisi, Gammarus sp., Mytilus edulis, Embletonia pallida, Platichthys flesus. These species are listed in order of increasing sensitivity to phospho-gypsum. After 4 days 100% mortality occurred in Balanus improvisus nauplii, Rhithropanopeus megalops and fertilized pike eggs in phospho-gypsum solutions containing 2.5 g/l, 10 g/l and 5 g/l respectively. At lower phospho-gypsum concentrations, some pike eggs hatched though fewer than in controls. In phospho-gypsum solutions the embryos developed more rapidly, and larvae were smaller as compared with controls. In shrimp phospho-gypsum solutions containing 3.75 g/l and 5 g/l caused an increase in the volume of hemolymph, a drop in its total protein content and a decrease in the tyrosinase activity. Concentrations of 187 mg/l and 312 mg/l inhibited ATP synthesis in the perch liver mitochondria. The 375 mg/l concentration caused swelling and damage to the mitochondria. In adult Rhithropanopeus the concentrations of 5 g/l caused degeneration of the brain neurosecretory cells. Under experimental conditions, in water from the Dead Vistula (Poland), containing phospho-gypsum at concentrations from 197 mg/l to 1.25 mg/l, the chlorophyll-a level rose. Detergent Solo had a similar effect. Concentrations of 7 free amino acids determined in water from the Dead Vistula and the Gdansk Bay exhibited seasonal fluctuations. Highest concentrations occurred in mid Aug. The amino acid level was higher in the Dead Vistula than in the Gdansk Bay.--Copyright 1978, Biological Abstracts, Inc.
W79-00748

LONG-TERM EFFECTS OF OIL SPILLS ON MARINE INTERTIDAL COMMUNITIES,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Biology; and Newcastle upon Tyne Univ. (England).
K. H. Mann, and R. B. Clark.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 791-795, May 1978. 4 fig, 10 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, Oct 10-14, 1977.

Descriptors: *Oil spills, *Oil pollution, *Environmental effects, *Water pollution effects, Biota, Sediments, Toxicity, Ecosystems, Arctic, *Outer Continental Shelf, Petroleum hydrocarbons.

The title of this symposium is 'Recovery Potential of Oiled Marine Northern Environments'. It is clear from the case histories of oil spills reported here that the potential for recovery is indeed present. In most cases, within 10 years of a single incident the community structure has returned to something approaching its normal state. The rate of recovery depends on many factors. One is the toxicity and quantity of oil involved; light fuel oil is much more toxic than crude oil or bunker oil and causes much greater environmental damage. Another is the nature of the shoreline on which the oil is stranded; on a high-energy, rocky shore the oil is dispersed and removed by wave action much more quickly than on a sheltered, sedimented site, where the oil may become incorporated in sediments, persist for many years, and cause chronic perturbation to the ecosystem. A third is the biology of the organisms that have been affected. Organisms with little or no mobility and slow rates of reproduction will take much longer to recolonize a damaged area than species that product large numbers of young that are widely dispersed. Since the former is a characteristic reproductive pattern for many organisms living in high latitudes, recovery of damaged arctic environments may be much slower than that of the temperate and subboreal environments that were the subject of these investigations. (Sinha-OEIS)
W79-00749

COLONIAL NESTING SEA AND WADING BIRD USE OF ESTUARINE ISLANDS IN THE PACIFIC NORTHWEST,
Graham (John) Co., Seattle, WA.
For primary bibliographic entry see Field 5E.
W79-00750

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; AN ENVIRONMENTAL INVENTORY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5E.
W79-00752

USE OF DREDGED MATERIAL ISLANDS BY COLONIAL SEABIRDS AND WADING BIRDS IN TEXAS,
Texas A and I Univ., Kingsville.
A. H. Chaney.
Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-78-8, April 1978. 317 p, 66 fig, 3 tab, 116 ref, 9 append.

Descriptors: *Birds, *Environmental effects, Islands, Habitats, *Texas, *Wading birds, Dredged material, *Dredged material disposal, *Waste disposal sites, Colonial birds.

Dredging operations in shallow coastal bays and estuaries have generated islands that have become a substrate for the development of plant and animal communities. Certain of these islands with their vegetative communities have become attractive to colonial seabirds and wading birds as nesting sites. This report assesses the environmental impact of dredged material disposal sites by gathering information on these islands in Texas waters. Thirty-four islands were selected for study, 17 in the Galveston-Houston area and 17 in the upper Laguna Madre near Corpus Christi. The islands were photographed, visited by boat, and measured as to elevation and area. More than 3000 soil samples were taken. Vegetation on each island was identified, measured, and quantified in over 3000 quadrats. Plant communities were identified and vegetation maps of each island were constructed. Birds using the islands as nesting sites were identified and their nests were monitored. Location of colonies was plotted on island maps and nesting information was summarized and placed in tabular form. Numbers and species of nesting birds were compared with those nesting on natural sites along the Texas coast. Recommendations were made concerning island construction, maintenance, and management in relation to nesting seabirds and wading birds. (WES)
W79-00753

AQUATIC DISPOSAL FIELD INVESTIGATIONS, DUWAMISH WATERWAY DISPOSAL SITE, PUGET SOUND, WASHINGTON; APPENDIX A: EFFECTS OF DREDGED MATERIAL DISPOSAL ON DEMERSAL FISH AND SHELLFISH IN ELLIOT BAY, SEATTLE, WASHINGTON,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
For primary bibliographic entry see Field 5E.
W79-00759

HABITAT DEVELOPMENT FIELD INVESTIGATIONS, MILLER SANDS MARSH AND UPLAND HABITAT DEVELOPMENT SITE, COLUMBIA RIVER, OREGON; APPENDIX F: POST-PROPAGATION ASSESSMENT OF WILDLIFE RESOURCES ON DREDGED MATERIAL,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5E.
W79-00760

AQUATIC DISPOSAL FIELD INVESTIGATIONS, COLUMBIA RIVER DISPOSAL SITE, OREGON; EVALUATIVE SUMMARY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5E.
W79-00764

THE PRODUCTION BIOLOGY OF EURASIAN WATERMILFOIL (MYRIOPHYLLUM SPICATUM L.): A REVIEW,
Michigan State Univ., Hickory Corners. W.K. Kellogg Biological Station.
J. B. Grace, and R. G. Wetzel.
Journal of Aquatic Plant Management, Vol. 16, p 1-11, June 1978. 2 fig, 4 tab, 95 ref. NSF BMS-75-20322 ERDA EY-76-02-1599, COO-1599/131.

Descriptors: *Eurasian wate milfoil, *Reviews, *Plant physiology, *Nutrient requirements, *Limiting factors, *Primary productivity, Myriophyllum spicatum, Myriophyllum exalbescens, Aquatic weeds, Aquatic weed control, Biology, Production, Submersed plants, Macrophytes, Photosynthesis, Respiration, Carbon, Biomass, Light, Competition, Kinetics, Absorption.

High inorganic carbon-fixing efficiency is partly responsible for the success of Eurasian water milfoil (Myriophyllum spicatum) in colonizing new habitats, replacing other submersed macrophytes, and avoiding nutrient limitations, according to a review of literature on physiological aspects of the aquatic weed's productivity. Avoidance of nutrient limitation apparently is related to certain anatomical features that aid in refixation of respired carbon dioxide. Milfoil seems disadvantaged in utilizing available light (based on metabolic criteria), but its growth form compensates for any metabolic deficiencies. The ability of M. spicatum to avoid nutrient limitations (especially nitrogen and phosphorus) is probably the result of root uptake from sediments and low requirement for these minerals, rather than because of well-adapted uptake kinetics. When evaluated by quantitative criteria, milfoil is not especially productive despite excessive growth. Anatomical features, growth form, low nitrogen and phosphorus requirements, and high vegetative reproductive capacity are major factors determining the distributional and competitive success of M. spicatum. Information reviewed in this paper is important in designing control methods, in understanding competition between milfoil and other plants (particularly in regard to light), and in studies of energy flow and nutrient cycling in lakes and reservoirs. (Lynch-Wisconsin)
W79-00768

MACROPHYTE CONTROL BY HARVESTING AND HERBICIDES: IMPLICATIONS FOR PHOSPHORUS CYCLING IN LAKE WINGRA, WISCONSIN,
Wisconsin Univ.-Madison. Dept. of Botany.
For primary bibliographic entry see Field 5G.
W79-00771

AQUATIC WEED MANAGEMENT BY BENTHIC SEMI-BARRIERS,
State Univ. of New York Coll. at Fredonia. Environmental Resources Center.
For primary bibliographic entry see Field 4A.
W79-00774

EFFECT OF WATER LEVEL FLUCTUATION AND HERBICIDE ON EURASIAN WATERMILFOIL IN MELTON HILL RESERVOIR,
Tennessee Valley Authority, Muscle Shoals, AL. Div. of Environmental Planning.
T. L. Goldsby, and A. L. Bates.
Journal of Aquatic Plant Management, Vol. 16, p 34-38, June 1978. 3 fig, 3 tab, 6 ref.

Descriptors: *Melton Hill Reservoir(TN), *Eurasian water milfoil, *Aquatic weed control, *Drawdowns, *Herbicides, *Methodology, *Chemcontrol, Mechanical control, 2,4-D, Tennessee, Tennessee Valley Authority, Impoundments, Clinch River, Myriophyllum spicatum, Water level fluctuations, Dewatering, Winterkilling, Freezing.

The most effective and economical way to control Eurasian water milfoil (Myriophyllum spicatum) in Melton Hill Reservoir, south of Oak Ridge, Tennessee on the Clinch River, was a combination of maintenance treatments with the herbicide 2,4-D, and high frequency, short-duration winter drawdowns. M. spicatum, first observed in the reservoir in late 1965, presumably was established in spring -1964. Short-duration drawdowns during cold weather effectively reduced infestation and did not proportionally increase infestations in deeper areas. Periodic exposure to subfreezing temperatures for 2-3 days had no effect on root crown viability, which could be reduced only by prolonged exposure sufficient to freeze the hydrosoil. Herbicidal treatment with the butoxyethanol ester and dimethylamine salt of 2,4-D at a rate of 22.5-45.0 kg acid equivalent/ha was effective against the plant. The drawdown and herbicide treatment schedule 1971-76 involved: (1) 1971-72--low water levels maintained mid-October to mid-February. (2) intermittent low water level mid-June to September 1972. (3) 1973-75--normal water level (about 241.5-242.1 m MSL), with 2,4-D treatment during the growing season. (4) 1975-76 and 1976-77--2-3 day drawdowns twice per month from August or September to March, with 2,4-D treatment during the growing season. The drawdown schedule for 1975-76 was as effective as the long-term drawdown of 1971-72. (Lynch-Wisconsin)
W79-00775

CHEMICAL CONTROL OF HYDRILLA,
Corps of Engineers, Washington, DC.
For primary bibliographic entry see Field 5G.
W79-00776

TOXICITY OF SULFURIC ACID TO AQUATIC PLANTS AND ORGANISMS,
Florida State Game and Fresh Water Fish Commission, Eustis. Eustis Fisheries Research Lab.
L. L. Trent, R. S. Hestand, III, and C. C. Carter.
Journal of Aquatic Plant Management, Vol. 16, p 40-43, June 1978. 3 fig, 13 ref.

Descriptors: *Toxicity, *Hydrilla verticillata, *Sulfuric acid, *Aquatic weed control, *Environmental effects, Acids, Fish, Aquatic animals, Insects, Bioassay, Hydrogen ion concentration, Najas guadalupensis, Vallisneria americana, Chara, Midges, Shrimp, Snails, Scuds, Mosquitofish, Largemouth bass, Micropterus salmoides, Gambusia affinis, Hyallela azteca, Palaemontes, Chironimidae, Planorbidae.

Field applications of sulfuric acid are more harmful to aquatic fauna than to Hydrilla verticillata and other aquatic weeds. Bioassay evaluation of the acid as a control for the nuisance weeds, and of effects on selected aquatic fauna, showed that aqueous solutions of sulfuric acid at pH 3 produced no toxic effects on hydrilla, but were extremely toxic to all faunal groups. Sulfuric acid would also be hazardous to the applicator and to the public, require high dosages, and produce erratic, unpredictable results. Testing of hydrilla, southern naiad (Najas guadalupensis), Vallisneria americana, and Chara sp in 57-liter aquaria resulted in erratic and temporary plant control, and effects were generally confined to the lower portion of the plants in direct contact with the acid layer. High plant density buffered toxic effects to a great degree. Fauna and hydrilla were tested in 3.8-liter bioassay jars. Fauna included largemouth bass (Micropterus salmoides), mosquitofish (Gambusia affinis), scuds (Hyalella azteca), fresh-

water shrimp (Palaemontes sp.), midges (Chironomidae), and snails (Planorbidae). All but midges and mosquitofish were killed at pH 3 within 24 hours. Snails, scud, and shrimp were very sensitive to pH change, with all scud killed at pH 3 in six hrs and all shrimp in two hrs. Largemouth bass were very tolerant to pH 5, but at pH 3 all were dead after 24 hrs. Mosquitofish mortality at pH 3 was 60% after eight hrs, and 80% after 24 hrs. (Lynch-Wisconsin)
W79-00777

COMPARATIVE EFFECTS OF GRASS CARP AND SELECTED HERBICIDES ON MACROPHYTE AND PHYTOPLANKTON COMMUNITIES,
Florida State Game and Fresh Water Fish Commission, Eustis. Eustis Fisheries Research Lab.
R. S. Hestand, and C. C. Carter.
Journal of Aquatic Plant Management, Vol. 16, p 43-50, June 1978. 6 fig, 3 tab, 11 ref.

Descriptors: *Macrophytes, *Phytoplankton, *White amur, *Herbicides, *Biocontrol, *Aquatic weed control, *Succession, *Eutrophication, Algae, Ctenopharyngodon idella, Fish, Chemcontrol, Hydrothol, Diquat, Cutrine, Nutrients, Phosphorus, Nitrates, Degradation(Decomposition), Najas guadalupensis, Chara, Ceratophyllum demersum, Myriophyllum spicatum, Hydrilla verticillata, Vallisneria americana.

Test pools containing communities of six aquatic macrophytes were treated with the herbivorous fish white amur (Ctenopharyngodon idella), Hydrothol 191, or diquat and Cutrine Plus to test biocontrol effectiveness and side effects on phytoplankton. Herbicide treatments quickly killed all plants tested--southern naiad (Najas guadalupensis), Chara sp., coontail (Ceratophyllum demersum), Eurasian water milfoil (Myriophyllum spicatum), Hydrilla verticillata, and Vallisneria americana--but nutrients released triggered dense phytoplankton blooms. White amur (grass carp) slowly consumed the macrophytes without producing the predicted stimulatory effects on phytoplankton. Approximately equal numbers of the six plants were planted in each of 45 plastic pools 366 cm in diameter, and allowed to establish for one year. Nine pools were stocked with one white amur each, nine were controls, and the rest were treated with herbicides (detailed in a previous paper). Southern naiad was eliminated by white amur in 130 days, Chara in 180, Coontail in 200, hydrilla in 205, and water milfoil in 265. Vallisneria increased until day 240, then declined; it was the least preferred by white amur. Southern naiad declined and coontail was eliminated by competition in controls, while water milfoil increased slightly and vallisneria increased considerably in controls. Effects of treatment on water quality and phytoplankton succession are discussed. (Lynch-Wisconsin)
W79-00778

EFFECT OF PH ON THE NATURE OF COMPETITION BETWEEN EICHHORNIA CRASSIPES AND PISTIA STRATIOTES,
Khartoum Univ. (Sudan).
M. Tagel Seed.
Journal of Aquatic Plant Management, Vol. 16, p 53-57, June 1978. 2 fig, 3 tab, 17 ref.

Descriptors: *Water hyacinth, *Hydrogen ion concentration, *Competition, *Ecology, *Water lettuce, *Limiting factors, Niches, Eichhornia crassipes, Light, Space, Aquatic plant, Pistia stratiotes, Floating plants, Acids, Plant growth.

Greenhouse experiments to test effects of various pH levels (4,7, and 9) on space competition between water hyacinth (Eichhornia crassipes) and water lettuce (Pistia stratiotes) showed Eichhoria to hae a clear advantage in mixed cultures, sometimes completely displacing Pistia. Plants of comparable size were chosen from natural populations. Five treatments were studied: a monoculture of each species and three mixed cultures in which each plant represented 25%, 50%, or 75% of the population, while initial overall density was kept constant at four plats. Plants were grown in three-liter plastic containers in 2% standard Long-Ashton culture solution; pH was adjusted using 5% sulfuric acid (with additions of anhydrous sodium sulfate) or 10% for 48 hrs, and dry weights determined. The Pistia monoculture indicated pH 4 was optimum for dry weight growth. Eichhornia yield decreased with increase in its proportion in mixed cultures at all pH levels, suggesting greater intraspecific than interspecific competition, but at all pH levels Eichhornia was the gaining species and Pistia the losing species. The number of Eichhornia plants remained constant in all cultures, Probably due to container limitation. The results demonstrate that the critical competitive element was limited surface (i.e., Light). (Lynch-Wisconsing)
W79-00780

THE EFFECT OF DAYLENGTH AND TEMPERATURE ON HYDRILLA GROWTH AND TUBER PRODUCTION,
Florida Univ., Gainesville.
T. K. Van, W. T. Haller, and L. A. Garrard.
Journal of Plant Management, Vol. 16, p 57-59, June 1978. 2 fig, 1 tab, 10 ref.

Descriptors: *Hydrilla verticillata, *Tubers, *Plant growth, *Water temperature, *Photoperiods, *Reproduction, Aquatic plants, Aquatic weed control, Light, Day length, Florida, Seasonal, Growth stages, Life cycles.

Pool studies in northern Florida (1976-77) of tuber formation by Hydrilla verticillata confirmed an earlier report that tuberization occurred October-April; a sharp decline noted December-January was due to cold weather. Growth chamber studies indicated the seasonal tuber production was production was primarily a response to short-day stimulus. Critical day length for tuberization apeared to be 13 hrs. No tubers were formed May-August when vegetative growth was greatest. Temperature had a marked effect on hydrilla growth ad tuber production; with maintenance of a 10-hr photopeiod, tuberization increased with increasing temperatures up to 33 C. At 9 C no tubers were formed, indicating that cold temperature was the primary reason for the drop in tuberization in mid-winter in the pool studies. Increased tuberization at higher temperatures was associated with a general increase in vegetative growth. Under tuber-inducing conditions (10-hr photoperiod), Tuberization appeared to depend on a adequate supply of phtosynthate. Higher temperatures during growth probably permitted more rapid photosynthate production, resulting in more tubers and larger size. in contrast with several other plants, cold water temperature is not required for hydrilla tuberization. Because of the temperature effect, maximum tuber production in the South may occur in fall and winter, but in the north only in fall. (Lynch-Wisconsin)
W79-00781

MACROINVERTEBRATES AND DIATOMS ON SUBMERGED BOTTOM SUBSTRATES, LAKE POWELL,
New Mexico Univ., Albuquerque. Dept. of Biology.
L. D. Potter, and E. Louderbough.
Available from the National Technical Information Service Springfield, VA 22161 as PB-272 692, Price codes: A04 in paper copy, A01 in microfiche. Report NSF/RA-770232, March 1977. 46 p. 5 fig, 3 tab, 31 ref, 1 append.

Descriptors: *Lake Powell(AZ UT), *Macroinvertebrates, *Diatoms, *Methodology, * Artificial substrates, *Periphyton, *On-site data collections, *Bottom sampling, Chironomids, Larvae, Reservoirs, Lakes, Arizona, Utah, Algae, Species composition, Species diversity, Diversity indices, Physa, Snails, Dermatitis, Human diseases, Baseline studies, Substrates, Biological communities, Fish food organisms, Water level fluctuations.

Plastic Christmas trees 57 cm tall were successfully used as artifical substrates to study the macroinvertebrate and diatom periphytic community in the littoral of Lake Powell (Arizona-Utah). The technique permitted collection, processing, and quantification of organisms associated with inundated vegetation. The trees were planted along a sloping sandy bottom at depths of 2, 3, 4, 5, 6, 8, and 10 meters, and at 4- and 12-week intervals between July 1973-October 1974, the trees were harvested using plastic bags, organisms were removed and the trees were replanted. Density and species composition were determined, and a diversity index was computed for the diatom component. Data indicate the organisms associated wth inundated vegetation constitute an improtant part of available fish food in the lake's littoral zone. Of macroinvertebrates, 95% were chironomid larvae (95% Dicrotendipes). Snails of the genus Physa, which can function as hosts for schistosome-dermatitis-producing cercariae, were found to concentrate on trees submerged for 12 weeks. The potential heath problem may impair recreational use of the lake, especially as shoreline biolmass increases. Though Lake Powell's aquatic community is developing in a manner similar to other man-made lakes, fluctuating water level and high sediment load produce a changing bottom substrate. A major remaining procedural problem is separation of fine silt from orgaisms. (Lynch-Wisconsin)
W79-00782

PLANKTON COMMUNITY STRUCTURE: EVALUATION OF ANALYTICAL METHODS USING MODEL COMMUNITIES,
Georgia Univ., Athens. Dept. of Zoology.
W. B. Hayes.
Available from the National Technical Information Service, Springfield, VA 22161 as SR0-852-2. Price codes: A06 in paper copy, A01 in microfiche. ERDA Report No. SR0-852-2, July 1976. 110 p. 9 fig, 13 tab, 19 ref, 1 append. AT(38-1)852.

Descriptors: *Computer models, *Plankton, *Analytical techniques, *Affinity tests, *Model studies, *Water pollution effects, *Statistical methods, Biological communities, Computer programs, Species composition, Effluents, Thermal pollution, Methodology, Bioindicators, Species diversity, Association analysis, Similarity, Fager test, Orloci method, Goodall index.

Three affinity tests (by FAger, Orloci, and Goodall) were evaluated for use in assessing plankton community structure as a means of measureing effects of effluents on plankton. A distribution model ws used to generate artificial data for the evaluation. The tests were: (1) Fager's recurrent group technique, (2) the Orloci sum-of-squares agglomeration method, and (3) Goodal's probabilistic similarity index. The Fager and Orloci procedures performed equally well with the model communities, but with samples taken along an outfall control line the Fager procedure was clearly superior. Problems in running the Goodall program made conclusive evaluation impossible. An appendix gives computer programs used in the study. Affinity testing can be used to supplement bioindicators and diversity indices in environental impact analysis. Also termed association analysis, affinity testing measures the degree of similarity between two or more objects, each of which is described by a set of attributes. For plankton colmmunities, the analysis can take various forms: (1) the objects can be sites, with affinity defined by the number of species in common at the sites; (2) the objects can be individual species, with affinity determined by occurrence in the same localities; and (3) the entire species list for an area can

be used as an indicator by grouping the stations; stations near the outfall may form a distinctive group. (Lynch-Wisconsin)
W79-00783

FLUORESCENCE LIFETIMES OF CHLORELLA PYRENOIDOSA,
Imperial Coll. of Science and Technology, London (England). Dept. of Botany.
L. E. Harris, G. Porter, J. A. Synowiec, C. J. Tredwell, and J. Barber.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A036 954, Price codes: A02 in paper copy, A01 in microfiche. Biochemica et Biophysica Acta, Vol 449, 1976, p 329-339. 3 fig, 1 tab, 28 ref.

Descriptors: *Chlorella pyrenoidosa, *Fluorescence, *Equations, *Photosynthesis, *Lasers, *Degradation(Decomposition), *Measurement, Algae, Chlorophyta, Kinetics, Darkness, Picoseconds, Nanoseconds, Methodology, Research equipment.

Fluorescence decay of the green alga Chlorella pyrenoidsosa was investigated under a variety of conditions in the picosecond and nanosecond time spans. Most flurorescence was accounted for by an expression of the form I(t)=I sub o exp-(At*Bt to the one-half power), though a additional exponential term was required to include a weak component of lifetie 32 ps observable only at the higher pulse intensities. This interpretation reconciles earlier and apparently conflicting data. The weak 32 ps component may be associated with Photosystem I, although it may an artifact of the high intensity pulses used. The main fluorescence, described by the equation above, is attributed to antenna chlorophyll; its form would be expcted from a single light harvesting array with trapping at randomly distributed sites. The form of the fluorescence decay given by the equation for C. pyrenoidosa should apply to the fluorescence of all green plants. In the experiments the picosecond pulses from a mode-locked eodymium (3+) glass laser were used. Fluorescence response was detected with an IMACON 600 streak camera coupled to a vidicon multichannel analyzer. Fluorescence from a photosynthetic organism provides direct insight into the initial photochemical processes involved in photosynthesis, and the technique used here extends the time resolution of fluorescence measurement. (Lynch-Wisconsin)
W79-00784

LEAF DECOMPOSITION IN A TROPICAL RAINFOREST STREAM,
Ohio State Univ., Columbus. Dept. of Botany.
D. E. Padgett.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 106, Price codes: A03 in paper copy, A01 in microfiche. Doctoral dissertation, Ohio State University Graduate School, 1975. 42 p, 11 fig, 7 tab, 47 ref, 2 append.

Descriptors: *Degradation(Decomposition), *Leaves, *Tropical regions, *Streams, *Rain forests, *Hyphomycetes, Fungi, Plant tissues, Puerto Rico, Luquillo National Forest(Puerto Rico), Spores, Proteins, Calories, Weight, Nitrogen, Enzymes, Running waters, Campylospora chaetocladia, Pyramidospora casuarinae, Triscelophorus monosporus.

Enzymatic activity of certain freshwater fungi (hyphomycetes) was a significant factor in decomposition of submerged leaf litter in a small stream in the Luquillo National Forest, a tropical rain forest in Puerto Rico. Leaf discs (1.4 cm in diameter) of Buchenavia capitata, Manilkara bidentata, and Dacryodes excelsa disintegrated completely in 26 weeks, compared with 32 weeks for Sloanea berteriana and Cordia borinquensis. Twelve hundred discs of each species were oven-dried five days at 45C, placed in 1.8-sq mm mesh screen packets, and anchored in the stream. Stream ranged from 3-32 cm in depth, and 27 cm to 2.3 m in width; base flow through its pools was normally 2-3 cm/sec. Morphological changes accompanying disintegration followed two basic patterns, depending on the rate at which epidermal layers disappeared; patterns were similar in that disintegration was restricted to localiized areas within the discs. No relationship was detected between weight loss and disintegration patterns, however. Sixteen species of hyphomycetes were identified from spores in stream foam or on submergedf leaves. Campylospora chaetocladia, Pyramidospora casuarinae, and Triscelophorus monosporus appeared to be involved in decomposition because of frequent appearance on the leaf discs. No significant increases in leaf disc nitrogen content were found that could be related to fungal protein, but caloric changes during disintegration suggested increasing fungal biomass. (Lynch-Wisconsin)
W79-00785

RELATION BETWEEN AQUATIC PLANTS AND GASTROPODS (MOLLUSCA, GASTROPODA) IN THE REGION OF THE GENTILLY I NUCLEAR CENTER (QUEBEC) (IN FRENCH),
Quebec Univ., Trois-Rivieres. Dept. of Chemistry-Biology.
E. Lacoursiere, G. Vaillancourt, and R. Couture.
Can J Zool 53(12), p 1868-1874, 1975.

Descriptors: *Aquatic plants, *Canada, *Gastropods, Gentilly, *Mollusca, Nuclear powerplants, Quebec, Rivers, *Thermal pollution, Water pollution effects.

This study is based on a sampling of the gastropods present in the vegetation of the St. Lawrence riverside zone at Gentilly (Canada). A total of 536 plant specimens belonging to 20 spp. as well as 37,239 specimens of 10 spp. of gastropods were sampled. Prosobranchs have no affinity whatsoever for any plant species in particular. The pulmonates, however, are found mainly on emergent plants.
W79-00794

PHYTOPLANKTON PRODUCTIVITY IN TOMAHAWK LAGOON, LAKE WAIPORI AND LAKE MAHINERANGI,
Otago Univ., Dunedin (New Zealand). Dept. of Zoology.
S. F. Mitchell.
N Z Mar Dep Fish Res Div Bull N S. 3, p 9-87, 1971.

Descriptors: *Phytoplankton, Photosynthesis, *New Zealand, *Lakes, Lagoons, *Productivity, *Lake Waipori,(NZ), Lake Mahinerangi(NZ).

In Lake Mahinerangi, a power-supply reservoir, the phytoplankton productivity as estimated by the 14C method is comparable with that in the least productive temperate lakes that have beeeen investigated. Mean rates of production in the daylight hours in 1964-65 were 2.02 mg of C/m3/hr at near-optimal light intensity (Pmax) and 76 mg of C/m2/day. Multiple regression analyses showed that 78.3% of the variation in hourly Pmax during 1964-65 could be accounted for by variations in temperature, water level, and day length. During summer and autumn, when productivity was highest, large fluctuations in productivity were recorded at the main sampling station at Lake Mahinerangi and these appeared to be related largely to variations in temperature. The annual production of O2 by photosynthesis in Lake Mahinerangi, as estimated from bottle experiments during 1963-64, amounts to only about 1/2 of the annual consumption by respiration. The concentrations of soluble reactive phosphate ranged from 0 to 3.0 mg of PO4-P/m3 ad showed no seasonal pattern of variation. Concentrations of other ionic solutes were low by comparison wth those in other New Zealand lakes. Oxygen concentrations at sunrise were within the range of 90-101% of saturation and did not vary with depth. In almost all of the samples from Lakes Mahinerangi and Waipori, which lie on the same river system, the most abundant phytoplankton were Cyclotella stelligera Cleve et Grunow and one of 2 spp. of Gymnodinium (G. limitatum Skuja and Gymnodinium sp.). Phytoplankton productivity per unit volume in Lake Waipori was slightly higher than that in Lake Mahinerangi. When the lakes were compared the mean assimilation per unit chlorophyll decreased in the same order as the mean productivity. Phytoplankton productivity, as estimated by the 14C method, varied between 36 and 88% light and dark bottle oxygen production estimates of gross productivity when the methods were compared directly in 4-hr experiments in Tomahawk Lagoo. tCopy--Copyright 1971, Biological Abstracts, Inc.
W79-00799

THE KNOWLEDGE OF THE PLANKTON OF LAKES OF GREECE: III. THE ZOOPLANKTON OF LAKE VENGORITIS. (IN GERMAN),
H. Mueller.
Folia Biochim Biol Graeca 13(3/4), p 67-90, 1976.

Descriptors: Eutrophication, *lake Vengoritis, *Phytoplankton, *Zooplankton, Water pollution effects.

Vengoritis Lake shows a wide variety of zooplankton and phytoplankton species. Many kinds are typical for this lake and are not found in other Macedonian lakes. Some of the plankton species indicate a level of eutrophy.--Copyright 1977, Biological Abstracts, Inc.
W79-00808

ZOOPLANKTON OF THE REGION OF NOSY-BE: V. CLADOCERA: CONTRIBUTION TO THE STUDY OF A TROPICAL EUTROPHIC BAY, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Nosy-Be (Madagascar). Centre Oceanographique (ORSTOM) de Nosy-Be.
S. Frontier.
Cah O R S T O M Ser Oceanogr. 11(3), p 259-272, 1973.

Descriptors: Zooplankton, Bays, *Cladocera, Estuaries, Eutrophication, Evadne-tergestina, Filtration, Malagasy-Republic, Nosy-Be, Penilia-avirostris, Phytoplankton, Rainfall, Sesonal, Tropical, *Zooplankton.

Spatiotemporal variations of the populations of Penilia avirostris and Edvane tergestina are discussed. The 2 spp. belong to the internal neritic settlement; the former is more strictly coastal than the latter. The populations develop very fast in the bays (Malagasy Republic) after the 1st heavy rains (Dec.). They reach a 1st maximum level in Feb.-March and a 2nd in July-Aug. separated by an interseasonal decrease. The 1st maximum is the principal maximum for Evadne. The situation is opposite for Penilia. The populations decrease drastically in Sept. During stratification of the neritic water (wet season), Evadne remains generally in the more superficial layers than Penilia. With the surface drifting toward the open sea and the estuarine circulation prevailing at this time of the year it sweeps Penilia towards the external neritic zone. Cladoceran populations seem to follow closely the abundance variations of phytoplankton, the later being directly affected by river flow. They are an essential link in trophic chains because of the filtration power they represent. (See also W77-02416)--Copyright 1975, Biological Abstracts, Inc.
W79-00809

ENTRAINMENT AT A ONCE-THROUGH COOLING SYSTEM ON WESTERN LAKE ERIE,
Michigan State Univ., East Lansing. Inst. of Water Research; and Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
R. A. Cole.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-286 953, Price codes: A08 in paper copy, A01 in microfiche. Report No EPA-600/3-78-070, July 1978. Vol I of II, 154 p, 19 fig, 37 tab, 80 ref. R801188.

Descriptors: *Entrainment, *Electric power plants, *Lake Erie, *Cooling water, *Thermal pollution, Aquatic life, *Plankton, *Environmental effects, Zooplankton, Cyanophyta, Chlorophyta, Phytoplankton, Periphyton, Ichthyoplankton, Chloride, Fish, Larvae, Aquatic environment, Industrial water, Fish conservation, Aquatic habitats, Conservation.

The rates of entrainment and effects on important components of the aquatic community being passed once through the cooling system of the steam-electric power plant (the Monroe Power Plant) were assessed. Phytoplankton, zooplankton, ichthyoplankton, and community metabolism were sampled bimonthly over a 3-yr period at fixed locations in the intake region, discharge canal, thermal plume, and source waters of Lake Erie. Concentrations of chloride and dissolved and total solids were used to trace water masses and their associated nutrient and plankton concentrations. At temperatures above 15 C in the discharge canal, photosynthesis was depressed and community respiration was accelerated. Algal abundance increased slightly with gree and blue-green algae increasing more than other taxa during passage; however, algal diversity remained basically unchanged. Densities of zooplankton declined about 40% in the cooling system, but diversity remained unchanged and the impact was masked by mixing in the receiving waters. Larval fish were concentrated near bottom at night and moved up during the day, and there were both temporal and geographical variations in distributions; consequently, some fish larvae seemed more vulnerable to entrainment than others. Large enough numbers of certain ichthyoplanktonic species and Leptodora kindtii may be entrained to at least slightly influence population abundances of adult organisms in western Lake Erie. The regeneration rates of smaller planktonic organisms in the source waters are likely to negate the local impact of the cooling systems on their populations. (Majtenyi-IPA)
W79-00878

PHYTOPLANKTON OF ALKALINE WATERS AT KANEM (CHAD): VII. THE STRUCTURE OF POPULATIONS, (IN FRENCH),
Lab. Hydrobiol., ORSTOM, N'djamena, Chad.
A. Iltis.
Cah O R S T O M Ser Hydrobiol. 8(1), p 51-76, 1974.

Descriptors: *Chad, Kanem, *Phytoplankton, *Salinity, Species, Biological communities, *Alkaline water, Ponds, Salt balance.

Phytoplankton organization was studied in a series of natroned temporary ponds and permanent lakes. In permanent waters, the higher the salinity of the lake, the lower the species diversity. Changes in the species diversity during 1 yr are not interpretable. The variations of the equitability follow those of the species diversity. Motumura's log-linear law of distribution can be adjusted to almost all the different species abundance distributions, the constant of milieu or Motomura's constant is lower as the salt concentration of the water is high. (See also W76-09596; W75-09020; and W75-06778) Copyright 1975, (Biological Abstracts, Inc.
W79-00884

EFFECTS OF WATER QUALITY, ANTIBIOTICS, PHYTOPLANKTON AND FOOD ON SURVIVAL AND DEVELOPMENT OF LARVAE OF SCYLLA SERRATA (CRUSTACEA:PORTUNIDAE),
Univ. Hawaii, Kaneohe, Inst. of Mar. Biol.
R. W. Brick.
Aquaculture. 3(3), p 231-244, 1974.

Descriptors: *Antibiotics, Artemia-salina, B. chlorella, Crustaceans, Food, Larvae, Penicillin, Phytoplankton, Polymyxin, Portunidae, Rotifers, Scylla-serrata, Survival, Water quality, Zooplankton, Water pollution effects.

Larvae on the portunid crab S. serrata were successfully reared using a combination of antibiotics (penicillin-G + polymyxin-B), phytoplankton (Chlorella sp.) and appropriate food (Artemia salina nauplii). Antiobiotics enhanced premetamorphic survival of zoeae while leaving rate of zoeal development and success of metamorphosis to megalopa unaltered. Water filtration and ultraviolet sterilization had no significant effect on rates of zoeal survival or development. Although antibiotics did not affect metamorphosis of megalopa to the crab stage, the antibiotic mixture may have been detrimental to survival to megalopae. The presence of Chlorella, unlike antibiotics, left zoeal survival unaffected while stimulating production of megalopae. As with antibiotics, time from hatching to megalopa formation was unaltered by the presence of Chlorella. Survival and development of zoeae varied with type and concentration of food organisms used. Feeding with Artemia nauplii produced highest larval survival and continued development. Rotifers and zooplankton as a food source failed to support zoeal survival to the onset of metamorphosis and failed to enhance survival when fed in combination with Artemia nauplii. A daily optimum food concentration of 10 Artemia nauplii/ml was established for zoeal survival. Megalopae survived better at the higher food (Artemia) concentrations used and tended to develop more rapidly to the crab stage at higher food levels.--Copyright 1975, Biological Abstracts, Inc.
W79-00891

RELATIONSHIP BETWEEN CYTOPLASMIC DISTRIBUTION OF MERCURY AND TOXIC EFFECTS TO ZOOPLANKTON AND CHUM SALMON (ONCORHYNCHUS KETA) EXPOSED TO MERCURY IN A CONTROLLED ECOSYSTEM,
British Columbia Univ., Vancouver. Inst. of Oceanography.
D. A. Brown, and T. R. Parsons.
Journal Fisheries Research Board Canada, Vol 35, p 880-884, 1978. 2 tab, 33 ref.

Descriptors: *Water pollution effects, *Heavy metals, *Toxicity, *Mercury, Salmon, Zooplankton, *Ecosystems, *Controlled Ecosystem Pollution Experiment(CEPEX), Oncorhynchus keta, International Decade of Ocean Exploration(IDOE).

Fish and zooplankton were simultaneously exposed to trace, 1, and 5 micro g Hg/L. In fish and zooplankton, pathological effects appeared to coincide with saturation metallolthionein and 'spillover' of Hg into the high molecular weight protein (enzyme-containing) pool. Coincidential with increase of Hg in tissue were decreases of Cu and Zn. Pathological effects of Hg are explained in terms of tertiary and quaternary structural changes in metalloenzymes resulting from replacement of Cu and Zn by Hg. Decreases in tissue Cu and Zn with increasing Hg concentration are discussed as an intracellular displacement of Cu and Zn by Hg and as duodenal and cellular exclusion processes. (NOAA)
W79-00892

SENSITIVITY OF THREE MICROALGAE TO CRUDE OILS AND FUEL OILS,
Texas Univ., Port Aransas. Marine Science Inst.
J. C. Batterton, K. Winters, and C. Van Baalen.
Marine Environmental Research, Vol 1, p 31-41, 1978. 1 fig, 6 tab, 8 ref. Also as Texas University Marine Science Institute Contribution No. 275. NSF OCE73-09740-A01 and OCE76-83913.

Descriptors: *Algae, *Toxicity, *Oil pollution, *Water pollution effects, Environmental effects, Testing, Photosynthesis, Cyanophyta, Chlorophyta, Diatoms, Crude oils, Fuel oils, Chlorella autotrophica, Agmenellum quadruplicatus, Cylindrotheca sp., International Decade of Ocean Exploration(IDOE).

Four crude oils and five fuel oils have been tested for toxicity with three microalgae--a blue-green, a green and a diatom. The crude oils were less inhibitory than equal amounts of fuel oils. Photosynthesis of a sensitive organism Chlorella autotrophica, strain 580, was only temporarily depressed by the crude oils. Four of the fuel oils inhibited photosynthesis, O2 output decreasing to zero without recovery. Classes of aromatic compounds which were not accountable for the toxicity observed here include naphthalene, methylnapththalenes, dibenzothiophenes, phenanthrenes and compounds with volatilities greater than methylnaphthalenes. Paraffinic and asphaltic fractions of fuel oil were also non-toxic. The accumulated chemical data suggest that the toxicity of whole fuel oils is due to the less water soluble types of compounds in the higher boiling aromatic fraction. (NOAA)
W79-00894

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF: PROGRAM WORK STATEMENTS FISCAL YEAR 1978, VOLUME I.
National Oceanic and Atmospheric Aministration, Boulder, CO. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W79-00895

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF: PROGRAM WORK STATEMENTS FISCAL YEAR 1978, VOLUME III.
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W79-00897

DIVERSITY AND LONGITUDINAL ZONATION IN FISH POPULATIONS OF TWO STREAMS ENTERING A METROPOLITAN AREA,
Toledo Univ., OH. Dept. of Biology.
E. J. Tramer, and P. M. Rogers.
Am Midl Nat. 90(2), p 366-374, 1973.

Descriptors: Diversity(Fish), *Fish populations, Metropolitan areas, Notropis-stramineus, Water pollution, Semotilus-astromaculatus, Streams, *Zonation(Fish), *Ohio.

The distribution and relative abundance of fishes were surveyed in Swan and Tenmile creeks, Lucas County, Ohio, from their headwaters in a rural agricultural area to points near the center of the city of Toledo, Ohio. In each creek 21 spp. were found. Of the total of 27 spp. collected only 2 Semotilus atromaculatus and Notropis stramineus, occurred at each sample station. Species diversity along both streams followed no definite pattern, even when the creeks became grossly polluted, since declines in the number of species present were often offset by shifts toward relative abundances which were more evenly distributed. Fish species diversity was not correlated with an index of habitat diversity. Furthermore, unlike other longitudinal zonations, diversity was not correlated with mean depth of the stream or with

distance from the headwaters; and species composition changes took the form of replacements rather than additions to the headwaters assemblage. Pollution stress probably cancelled out the effects of factors such as substrate diversity and mean depth, thereby obliterating the normal patterns of diversity and longitudinal zonation.--Copyright 1974, Biological Abstracts, Inc.
W79-00903

THE EFFECTS OF TEMPERATURE ON THE GROWTH AND SURVIVAL OF LARVAL AND JUVENILE CRAYFISH, PACIFASTACUS LENIUSCULUS,
California Univ., Davis. Dept. of Animal Science.
J. W. Cornacchia.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 435, Price codes: A04 in paper copy, A01 in microfiche. Master of Science Thesis, June 1978. 64 p, 11 fig, 13 tab, 52 ref. (California Water Resources Center Project UCAL-WRC-W-475). OWRT A-056-CAL(4).

Descriptors: *Crayfish, *Temperature, *Thermal pollution, Thermal stress, Growth stages, *Larval growth stage, *Juvenile growth stage, *Growth rates, Water pollution effects, Mortality.

The growth and survival of compartmentalized subyearling Pacifastacus Leniusculus were studied in the laboratory at temperatures of 14.5 degrees through 25.5 degrees C. Growth in weight was maximum at 22.0 degrees C. Cephalothorcic growth was .0642 mm/day (stages II-V) at the same temperature. The temperature predicted to produce optimum growth in length for stages II to V was calculated to be 20.0 degrees C. The effects of temperature on crayfish growth were primarily due to the acceleration of developmental rates as opposed to differences in incremental growth. Hiatt graphic analysis demonstrated that the coefficient of growth ranged from 1.16 to 1.33. Mortality was proportional to thermal shock during state I. After stage I, crayfish reared at warmer temperatures had the best record of survival except at 17.0 degrees C. Morphometric analysis revealed that a linear relationship existed between diameter and weight of eggs. A new allometric model is presented that describes weight as a function of length of carapace in larval and juvenile stages (<13 mm). (Snyder-Calif Davis)
W79-00909

THE EFFECTS OF IRRIGATION RETURN WATER ON AQUATIC PLANTS (PERIPHYTON) IN THE SACRAMENTO RIVER AT KNIGHTS LANDING, CALIFORNIA,
California Univ., Davis. Dept. of Land, Air and Water Resources.
S. P. Hayes, A. W. Knight, D. E. Bayer, and G. R. Sanford.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 322, Price codes: A05 in paper copy, A01 in microfiche. Technical Completion Report, Contribution No. 167, California Water Resources Center, University of California, Davis, February 1978. 75 p, 13 fig, 93 tab, 45 ref, 2 append.

Descriptors: *Irrigation water, *Return flow, Effects, *Aquatic plants, *Sacramento River(Cal), Summer, Seasonal, Measurement, Evaluation, Outfalls, Water quality, Abiotic factors, Biotic parameters, Statistical methods.

The characteristics of irrigation return water (IRW) from the Glenn-Colusa Irrigation District (GCID) and the impact of the IRW on the Sacramento River water (SWR) were studied through three summer irrigation seasons at stations above, in, and below the Colusa Drain at Knights Landing, California. The IRW in this outfall (IO) has significantly higher levels of all the abiotic factors measured (suspended matter, water turbidity, specific electrical conductance, major cation and major anion concentrations, water temperature, and hydrogen ion concentrations) than the SRW above the outfall (AO). The biotic parameters evaluated (densities of dominant diatoms, total diatom density, chlorophyll a, b, and c levels, and caloric content or organic matter levels) were obtained from periphyton communities harvested from glass substrates, and often had values significantly lower in IO and AO, with enhancement at stations below the outfall (BO). Stations were compared statistically using an analysis of variance followed by Duncan's multiple-range transformation of the data. The GCID IRW was found to differ significantly from the SRW and to have an impact on the SRW BO. (Graf-Cornell)
W79-00914

MAMMALIAN TOXICOLOGICAL EVALUATION OF WASTEWATERS RESULTING FROM THE MANUFACTURE OF PRIMERS,
Midwest Research Inst., Kansas City, MO.
H. V. Ellis, III, and D. O. Helton.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A034 890, Price codes: A05 in paper copy, A01 in microfiche. Report to U.S. Army Medical Research and Development Command, Contract No. DAMD-17-75-C-5053, 88 p, October 1975. 5 fig, 6 tab, 21 ref.

Descriptors: *Toxicity, *Industrial wastes, *Chemical wastes, *Explosives, Chemical properties, Chemical analysis, Organic compounds, Animal physiology, Mortality, Chromatography, Waste water(Pollution), Lead, Bioassay, Water pollution effects, *Antimony, *Munitions, Munitions wastes.

Chemical characterization and animal toxicity studies on five desensitized primers, four wastewaters from primer production and one desensitization 'blank' were performed. High pressure liquid chromatography was most useful in characterizing the organic compounds present in the various samples. The original organic compounds were present in trace quantities of entirely absent from desensitized pure tetrazene, desensitized pure lead styphnate, desensitized pure trinitroresorcinol, tetrazene wastewater, primer mixture FA 956 wastewater, lead styphnate wastewater, and trinitroresorcinol wastewater. Desensitized tetrazene and desensitized primer mixture FA 956 were moderately toxic, with LD50's between 3 and 5 g solids/kg body weight in rats. Lot 3 of tetrazene wastewater was relatively toxic, with LD50's between 0.3 and 0.8 g/kg in rats and mice. The toxicity appears to be due to two characterized but unidentified organic compounds. The other samples were nontoxic in these animals. (EIS-Deal)
W79-00915

AQUATIC LIFE FIELD STUDIES AT BADGER ARMY AMMUNITION PLANT, (FINAL PHASE II REPORT, VOLUME 1),
Battelle Columbus Labs., Columbus, OH.
J. M. Stilwell, D. C. Cooper, M. A. Eischen, M. C. Matthews, and B. E. Sherwood.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A033 547, Price codes: A06 in paper copy, A01 in microfiche. Report to U.S. Army Medical Research and Development Command, DAMD 17-74-C-4123, 100 p, August 1976. 16 fig, 17 tab, 50 ref.

Descriptors: *Chemical wastes, *Toxicity, *Explosives, Water quality, Water analysis, Water chemistry, Bottom sediments, Benthic fauna, Periphyton, Industrial wastes, Organic compounds, Chemical properties, Water pollution effects, Chemical analysis, Phytoplankton, *Munitions, *Species diversity, *Nitrocellulose, *Nitroglycerin.

The objective of this study was to collect quantitative data describing the specific nature of effluent effects and the amount of primary munitions constituents in the effluents. Areas investigated included water quality, sediment chemistry, munitions constituent concentrations, periphyton community and the benthic macroinvertebrate community. In addition, the ecological responses to two primary munitions compounds, nitrocellulose and nitroglycerine, were examined. (EIS-Deal)
W79-00916

AQUATIC LIFE FIELD STUDIES AT JOLIET ARMY AMMUNITION PLANT, (FINAL PHASE II REPORT, VOLUME 1),
Battelle Columbus Labs., Columbus, OH.
J. M. Stilwell, D. C. Cooper, M. A. Eischen, M. C. Matthews, and B. E. Sherwood.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A033 548, Price codes: A07 in paper copy, A01 in microfiche. Report to U.S. Army Medical Research and Development Command, DAMD 17-74-C-4123, 130 p, August 1976. 28 fig, 44 tab, 45 ref.

Descriptors: *Explosives, *Chemical wastes, Industrial wastes, Chemical properties, Chemical analysis, Water quality, Water analysis, Effluents, Bottom sediments, Benthic fauna, Periphyton, Biological communities, Water pollution sources, Waste water(Pollution), *TNT, *Species diversity.

The objectives of this study were to collect quantitative data describing the specific nature of TNT manufacturing effluent effects on aquatic receiving systems and to determine the relationship between observed effects and the amount of munitions constituents in the effluents. Areas investigated included water quality, sediment chemistry, munitions constituent concentrations, the periphyton community and the macroinvertebrates community. Monitoring of TNT and two degradation products was conducted at sampling sites and plant outfalls. (EIS-Deal)
W79-00917

ACUTE TOXICITY OF RESIDUAL CHLORINE AND AMMONIA TO SOME NATIVE ILLINOIS FISHES,
Illinois State Water Survey, Urbana. Dept. of Registration and Education.
D. P. Roseboom, and D. L. Richey.
Illinois State Water Survey, Report of Investigation 85, 1977, ISWS/RI-85/77, 42 p. 10 fig, 13 tab, 61 ref, 5 append.

Descriptors: *Chlorine, *Ammonia, *Illinois, Freshwater fish, Bioassay, Toxicity, Mortality, Laboratory tests, Sunfish, Channel catfish, Bass, *Water quality standards, *Water pollution effects, Water temperature.

Ninety-six hour residual chlorine bioassays were conducted on bluegill and channel catfish. In 96-hour acute toxicity studies with ammonia (NH3-N) bass, in addition to blue-gill and channel catfish, were included. The studies were performed in waters typical of most lakes and streams in midwestern states, i.e., relatively high in alkalinity and the salts of calcium and magnesium. Observations regarding the characteristics and reaction of the fishes to each toxicant were noted. For residual chlorine the 96-hour TL50s ranged from 0.18 to 0.33 mg/l for bluegill, depending on temperature and fish weight. For channel catfish the TL50 was about 0.09 mg/l; temperature was not a factor. For ammonia the 96-hour TL50s for bluegill were dependent on temperature and fish weight and varied form 0.40 to 1.3 mg/l. Size was not a factor for bass and channel catfish. Ninety-six hour TL50s for these fishes ranged from 0.72mg/l at 22C to 1.2mg/l at 30C for bass and 1.5mg/l at 22C to 3.0mg/l at 28C for channel catfish. For the protection of the fishes investigated, and consistent with the water pollution regulations of Illinois, residual chlorine

in Illinois waters should not be detectable and NH3-N should not exceed a concentration of 0.04 mg/l. (EIS-Deal)
W79-00918

CRISIS SCIENCE: INVESTIGATIONS IN RESPONSE TO THE ARGO MERCHANT OIL SPILL,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
A. M. Pollack, and K. D. Stolzenbach.
Sea Grant Program Report No. MITSG-78-8, Index No. 78-308-Cmw, June 1978. 329 p, 42 fig, 3 tab, 90 ref, append. SG-04-7-158-44079.

Descriptors: *Oil spills, *Water pollution effects, Massachusetts, Oil pollution, Biological effects, *Argo Merchant oil spills.

The Argo Merchant oil spill on Nantucket Shoals (Massachusetts) in December 1976, was the focus of a massive scientific investigation. More than 200 scientists were involved in predicting and studying the fate and effects of the spill, at a cost exceeding $800,000. The report outlines three reasons scientists might want to take action following a spill and points out that previous post-spill activities have been somewhat less than successful in meeting these goals. The scientific work following the Argo Merchant spill is then reviewed as a case study of such post-spill science. The story of how the scientific response developed is told more or less chronologically and the scientific follow-up to the spill was not as good as it could have been. This was partly because of science's limited understanding of spills and limited ability to interpret data; but it was also partly because of logistical and institutional facotrs. The case is made that studying a spill is in many ways as demanding as trying to clean it up. A quick and efficient response is needed on extremely short notice to prevent valuable data from being lost and to provide scientific input into the cleanup effort in a timely manner. Some sort of research contingency plan is needed. This report concludes with some guidelines for formulation of such a plan. (NOAA)
W79-00929

TIDAL AFFECTED DISTRIBUTIONS OF SURFACE CHLOROPHYLL AND TRANSPARENCY IN THE NEW YORK BIGHT,
Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
For primary bibliographic entry see Field 5B.
W79-00933

POLYCHLORINATED BIPHENYLS, CHLORINATED PESTICIDES AND TRACE METALS IN SOILS OF THE EVERGLADES NATIONAL PARK AND ADJACENT AGRICULTURAL AREAS,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Atmospheric Labs.
For primary bibliographic entry see Field 5B.
W79-00934

THE AMOCO CADIZ OIL SPILL. A PRELIMINARY SCIENTIFIC REPORT,
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.; and Environmental Research Lab., Narragansett, RI.
For primary bibliographic entry see Field 5B.
W79-00935

IRON-ALGAE INTERACTIONS AS A FACTOR IN LAKE ERIE WATER QUALITY,
State Univ. of New York at Fredonia. Environmental Resources Center.
T. A. Storch.
Sea Grant Report. (1977), 25 p, 8 fig, 1 tab, 14 ref.

Descriptors: *Water quality, Algae, Photosynthesis, *Lake Erie, *Iron, *Phytoplankton, Phosphorus.

Nutrient enrichment analyses revealed that both chelated and unchelated iron affect the phytosynthetic rate of natural phytoplankton communities in eastern Lake Erie. Depending on the form, the concentration, and the time of year, iron additions may stimulate or inhibit algal photosynthesis. However, iron discharges from wastewater treatment plants using iron for phosphorus removal may not significantly affect algal growth in Lake Erie because of the high dilution effect. (NOAA)
W79-00936

PREFERENTIAL ELIMINATION OF DIELDRIN BY SOME DIATOMS COMPARED TO CHLAMYDOMONAS AND SCENEDESMUS SPECIES,
Marburg Univ. (Germany, F.R.). Fachbereich Biologie.
For primary bibliographic entry see Field 5B.
W79-00937

TOXICITY AND SUBLETHAL EFFECTS OF NO. 2 FUEL OIL ON THE SUPRALITTORAL ISOPOD LYGIA EXOTICA,
Texas A and M Univ., College Station. Dept. of Biology.
T. M. Dillon, J. M. Neff, and J. S. Warner.
Bulletin of Environmental Contamination and Toxicology, Vol. 20, p 320-327, 1978. 1 fig, 2 tab, 15 ref.

Descriptors: Oil, *Oil spills, *Isopods, *Toxicity, *Respiration, Oil pollution, Fuels, Organic compounds, Animal behavio, Animal physiology, Animal metabolism, Mortality, Absorption, Water pollution effects, Tissue analysis, *Dibenzothiophenes, *Lygia.

No. 2 fuel oil was of relatively low toxicity to the intertidal isopod Lygia exotica. Respiration was not significantly affected by short-term exposure to several concentrations of No. 2 fuel oil prepared as either a water-soluble fraction or an oil-in-water dispersion. Lygia contaminated by a spill of No. 2 fuel oil and Bunker C residual oil contained high concentrations of dibenzothiophenes. It is not known whether the dibenzothiophenes were accumulated by the Lygia tissues or adsorbed to the exoskeleton. Therefore, the high mortality of Lygia following the spill cannot yet be attributed to the dibenzothiophenes. (EIS-Deal)
W79-00938

TOXICITY OF PERCHLOROETHYLENE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE AND METHYLENE CHLORIDE TO FATHEAD MINNOWS,
Dow Chemical Co., Midland, MI. Environmental Sciences Research Lab.
For primary bibliographic entry see Field 5A.
W79-00939

THE EFFECT OF LEAD ON OXYGEN UPTAKE IN THE CRAYFISH, ORCONECTES VIRILIS (HAGEN),
Northern Illinois Univ., De Kalb. Dept. of Biological Sciences.
R. V. Anderson.
Bulletin of Environmental Contamination and Toxicology, Vol. 20, p 394-400, 1978. 3 fig, 21 ref.

Descriptors: *Lead, *Crayfish, *Toxicity, Heavy metals, Air pollution effects, Animal physiology, Animal metabolism, Path of pollution, Oxygen requirements, Oxygen demand, Water chemistry, Water quality, Water analysis, Chemical analysis, Water pollution effects, Crustaceans, *Tissue analysis, *Bioaccumulation.

It was determined that increasing concentrations of lead will cause some decrease in the ability of O. virilis to take up oxygen. The crayfish was able to acclimate to the metal concentration by compensating for decreased gill efficiency through increasing its ventilation volume. Crayfish tend to take up lead primarily in the exoskeleton and gills. Concentration in these body parts increased as environmental concentration and time increased. (EIS-Deal)
W79-00941

FIELD VERIFICATION OF CADMIUM TOXICITY TO LABORATORY DAPHNIA POPULATIONS,
Argonne National Labs, IL. Radiological and Environmental Research Div.
J. S. Marshall.
Bulletin of Environmental Contamination and Toxicology, Vol. 20, No. 3, p 387-393, 1978. 1 fig, 3 tab, 5 ref.

Descriptors: *Cadmium, *Growth rates, *Toxicity, *Daphnia, Metals, Mortality, Population, Productivity, Reproduction, Epilimnion, Water chemistry, Chemical analysis, Water analysis, Regression analysis, Laboratory tests, Bioassay.

The purpose of this paper is to compare the short-term toxicity of cadmium to laboratory populations of D. galeata mendotes with that to natural populations of D. galeata mendotae and total Daphnia in Lake Michigan, as indicated by its effects on the populations' rates of increase. The relationship between the two populations' growth rates and cadmium concentrations was analyzed using regression analysis. While some differences between the two populations, they were observed, they were judged to not differ significantly in their sensitivity to cadmium.
W79-00942

A SUBLETHAL TECHNIQUE FOR ASSESSING THE EFFECTS OF CONTAMINANTS USING HYDRA LITTORALIS,
Institute for Marine Environmental Research, Plymouth (England).
A. R. D. Stebbing, and A. J. Pomroy.
Water Research, Vol. 12, p 631-635, 1978. 5 fig, 1 tab, 28 ref.

Descriptors: *Copper, *Toxicity, *Reproduction, Metals, Metabolism, Resistance, Growth rates, Adaptation, Cytological studies, Bioassay, Chemical analysis, Water quality, Water chemistry, Water analysis, Water pollution effects, *Hydra.

A technique is described for estimating the biological effects of low levels of contaminants using an index of response the rate of asexual reproduction of Hydra littoralis. Preliminary experiments show the rate of reproduction becomes significantly inhibited by levels of 2-12 micrograms Cu2+ l-1, although it appears that the rate oscillates for some days after the initial exposure to inhibitory agents. A control mechanism appears to regulate the rate of asexual reproduction and within the range of 0.5-2.5 microgram Cu2+ l-1 this mechanism enables the organism to counteract the inhibitory effect of copper, restoring growth to that of the controls after about 7 days. The concept of a quantifiable counter response is considered in a toxicological context. (EIS-Deal)
W79-00944

EFFECTS OF COPPER, PH AND HARDNESS ON THE CRITICAL SWIMMING PERFORMANCE OF RAINBOW TROUT (SALMO GAIRDNERI) RICHARDSON,
Guelph Univ. (Ontario). Dept. of Zoology.
K. G. Waiwood, and F. W. H. Beamish.
Water Research, Vol. 12, p 611-619, 1978. 5 fig, 3 tab, 70 ref.

Descriptors: *Copper, *Hydrogen ion concentration, *Hardness(Water), *Water chemistry, *Rainbow trout, Water analysis, Toxicity, Fish behavior, Metals, Heavy metals, Fish physiology, Animal metabolism, Water pollution effects, Mortality, Copper compounds.

Critical swimming velocities of Salmo gairdneri at 12C were determined in different combinations of copper, pH, and hardness. Measurements were made after exposure for 0.5, 5, 10, and 30 days. When copper was not applied, hardness, pH, and exposure time had no appreciable effect on critical performance. Copper had the greatest effect on swimming performance at 5 days of exposure. For any given hardness, copper had a greater effect on critical speed at low than at high pH. A given copper treatment had a more pronounced effect at low than at high hardness. Oxygen consumption of trout was determined in different combinations of copper and pH. In the presence of copper the maximum oxygen consumption decreased and the energy expenditure for a given swimming speed increased. The above observations are discussed in relation to reported toxic actions of copper. (EIS-Deal)
W79-00945

THE EFFECT OF PREHATCH AND POSTHATCH EXPOSURES TO CADMIUM ON SALINITY TOLERANCE OF LARVAL GRASS SHRIMP, PALAEMONETES PUGIO,
Environmental Research Lab., Gulf Breeze, FL.; and Environmental Research Lab., Johns Island, SC. Bears Bluff Field Station.
D. P. Middaugh, and G. Floyd.
Estuaries, Vol. 1, No. 2, p 123-125, 1978. 2 fig, 1 tab, 11 ref.

Descriptors: *Cadmium, *Toxicity, *Salinity, *Shrimp, *Resistance, Metals, Growth rates, Embryonic growth stage, Larval growth stage, Mortality, Water pollution effects, Water temperature, Bioasay, *Survival.

Groups of embryonic grass shrimp, Palaemonetes pugio, were exposed to cadmium for the last 1, 4 or 8 days prior to hatching. Other groups of embryos were cultured in uncontaminated seawater. Prehatch exposure to cadmium was found to have no additive effect on the sensitivity of the larvae to cadmium exposure and salinity stress for 14 days after hatching. No significant decreases in survival were observed for any larvae transferred to 15 and 30 ppt salinity at a pre- and posthatch cadmium concentration of 0.1 mg/l. At a pre- and posthatch cadmium concentration of 0.3 mg/l, significant decreases in survival were observed for all of the larvae transferred to 10 and 15 ppt salinity after hatching. Significant decreases in survival were observed for only 2 of the groups exposed before hatching and transferred to 30 ppt salinity and 0.3 mg/l cadmium after hatching. (EIS-Deal)
W79-00947

AVIAN CHLOREA AND ORGANOCHLORINE RESIDUES IN AN AMERICAN OYSTER-CATCHER,
Fish and Wildlife Service, Laurel, MD. Patuxent Wildlife Research Center.
For primary bibliographic entry see Field 5B.
W79-00948

EVALUATION OF AN AIR BUBBLER TO MITIGATE FISH IMPINGEMENT AT AN ELECTRIC GENERATING PLANT,
Texas Instruments Inc., Buchanan, NY.
For primary bibliographic entry see Field 5G.
W79-00950

UPTAKE, DISTRIBUTION, AND ELIMINATION OF THE LAMPRICIDE 2', 5-DICHLORO-4'-NITRO(14C) SALICYLANILIDE (BAYER 2353) AND ITS 2-AMINOETHANOL SALT (BAYER 73) BY LARGEMOUTH BASS,
Fish and Wildlife Service, Warm Springs, GA. Southeastern Fish Control Lab.
For primary bibliographic entry see Field 5B.
W79-00951

ECOLOGICAL STUDIES OF FISHPONDS IN CHUPEI,
National Taiwan Univ., Taipei Dept. of Zoology.
Y. S. Lin.
Bulletin of the Institute of Zoology, Academia Sinica, Vol. 17, No. 1, p 43-59m 1976. 9 fig, 2 tab, 26 ref.

Descriptors: *Chlorophyll, *Carp, Productivity, Zooplankton, Nutrients, Hydrogen ion concentration, Seasonal, Phytoplankton, Ecology, Fertilizers, Fish management, Number fish per acre, Fish farming, Photosynthesis, Aquiculture, Fish ponds.

Ten fishponds were chosen from Chupei Fishery Institute to study the relationship among the amount of chlorophyll, zooplankton, gross production, and environmental factors. In July these ponds were stocked with fry of silver carp, common carp, grass carp, bighead, and crucian carp. Except two control ponds, the other eight ponds were treated with different fertilizers. From July through October, water samples were taken biweekly for the measurements of various variables. The seasonal variation of chlorophyll, gross production, zooplankton abundance, pH and water trasnparency were presented. All the variable studied showd no consistent seasonal pattern among the ten fishponds. The variations existed even between ponds with similar treatment. Whereas the variation of gross production, zooplankton abundance, pH and water transparency were all closely related to the amount of chlorophyll concentration. The mean coefficient of determination suggest that 70% of the variation of transparency in the fishponds could be explained by the chlorphyll concentration. However, the present study failed to show the close relationship of the production of various species of fish on the gross production, chlorophyll cncentration and zooplankton abundance.
W79-00952

POLYCHLORINATED BIPHENYLS IN THE BIOMASS OF THE BALTIC,
Uppsala Univ. (Sweden). Inst. of Zoophysiology.
For primary bibliographic entry see Field 5B.
W79-00953

EXCHANGE OF HEAVY METALS IN ASCOPHYLLUM NODOSUM (L.) LE JOL. IN SITU BY MEANS OF TRANSPLANTING EXPERIMENTS,
Trondheim Univ. (Norway). Inst. of Marine Biochemistry.
S. Myklestad, I. Eide, and S. Melsom.
Environmental Pollution, Vol. 16, p 277-284, 1978. 2 fig, 5 tab, 12 ref.

Descriptors: *Path of pollutants, *Heavy metals, *Marine algae, *Plant physiology, *Absorption, On-site investigations, Marine plants, Algae, Growth stages, Biochemistry, Copper, Lead, Cadmium, Mercury, Water pollution effects, Aquatic plants, Zinc, Bioindicators.

Plants of Ascophylum nodosum were tranferred from a locality with high concentrations of heavy metals in the sea water (Eikhamrane) to a locality with low concentrations (Flak). The alga grew for five months at the new locality. The zinc, lead, cadmium ad mercury contents in newly-grown tips were found to approach those in the tips of the the native plants in Flak. Inthe older parts of the plants the zinc and mercury contents decreased somewhat but remained high during the period investigated. The results are discussed in terms of current theories of heavy metal exchange in brown algae.
W79-00955

THE EFFECT OF FENITROTHION ON REPRODUCTION OF A TELEOST FISH, CYPRINUS CARPIO COMMUNIS LINN: A BIOCHEMICAL STUDY,
Punjab Agricultural Univ., Ludhiana (India). Dept of Zoology and Entomology.
K. Kapur, K. Kamaldeep, and H. S. Toor.
Bulletin of Environmental Contamination and Toxicology, Vol. 20, p 438- 442, 1978. 1 tab, 11 ref.

Descriptors: *Fish reproduction, *Enzymes, *Biochemistry, *Pesticide toxicity, *Carp, Fish physiology, Animal metabolism, Pesticide residues, Pesticides, Toxicity, Animal pathology, Fish diseases, Path of pollutants, Water pollution effects, Growth stages, Inhibition, Inhibitors, Chemical properties, *Fenitrothion, Tissue analysis.

The level of 3 beta-HSD, along with that of various other steroid dehydrogenases is indicative of steroidogenesis in the gonadal tissue. It was demostrated that treatment with fenitrothion caused a great reduction in the activity of 3 beta-HSD in testicular and ovarian extracts fron carp. It was suggested that the action of fenitrothion on the gonads may be either by inhibition of the adenylcyclase enzyme or the inhibition of RNA and protein sysnthesis.
W79-00956

LACK OF EFFECT OF INGESTED FORTIES FIELD CRUDE OIL ON AVIAN GROWTH,
Aberdeen Univ. (Scotland). Dept. of Zoology.
M. L. Gorman, and C. E. Simms.
Marine Pollution Bulletin, Vol 9, p 273-276, 1978. 6 fig, 1 tab, 4 ref.

Descriptors: *Oil, *Growth rates, *Gulls, *Toxicity, Oil spills, Oil pollution, Water pollution effects, Animal physiology, Animal metabolism, Uptake, Amino acids, Proteins, Immature growth stages, Organic compounds, *Crude oil, *Tissue analysis, Kuwait crude, Louisiana crude.

The reported cessation of growth by young herring gulls dosed with Kuwait and Louisiana crude oil was not observed when chicks of herring gull and other birds were dosed with Forties crude oil from the North Sea. One reason for this discrepancy is thought to be that the former birds may already have completed their growth at the time of the experiments. (EIS-Deal) or development is recommended. This process advocates the full and effective use of the communication media to ensure that the plan would be developed and implemeted in consultation with all those affected. Second, the goals and objectives of the plan should be clearly stated and the means for implementing these measures should be delineated. The goals listed are the improvement of economic productivity; the overall improvement of environmetal quality through conservation; and the improvement of the quality of life of low income groups in waterfront areas. Third, the goals are operationalized and translated into specific policy recommendations for various functional areas of waterfront such as shellfish preservation, enlargement of parks and marinas, flood and storm damage control, water quality and others. An inventory of existing resources and uses in investigated in depth to provide a sound basis for the adoption of these plans.
W79-00957

A TOXICOLOGICAL EVALUATION OF A PLASTIC OIL ABSORBANT,
Tromso Univ. (Norway). Inst. of Biology and Geology.
S. Lonning, and B. E. Hagstrom.
Marine Pollution Bulletin, Vol. 9, p 276-278, 1978. 2 tab, 7 ref.

Descriptors: Oil, *Oil spills, *Dispersion, *Toxicity, Oil pollution, Organic compounds, Chemical analysis, Plastics, Animal physiology, Reproduction, Embryonic growth stage, Fish physiology, Larval growth stage, Copepods, *Crude oil, *Dispersants, *Sea urchin.

The effect of a plastic oil absorbant was tested on several different test organisms of different taxonomic positions. The results indicate that the Oil Killer under the experimental conditions described, acts as an almost inert nontoxic substance. The Oil effects were recorded. In combination with crude oil the Oil Killer seems to reduce the serious ill effects exerted by oil alone.
W79-00958

ACUTE TOXICITY OF COPPER TO A COPEPOD,
Athens Univ. (Greece). Zoological Lab. and Museum.
M. Moraitou-Apostolopoulou.
Marine Pollution Bulletin, Vol. 9, p 278-280, 1978. 1 fig, 1 tab, 20 ref.

Descriptors: *Copepods, *Toxicity, *Copper, *Adaptation, Bioassay, Industrial wastes, Domestic wastes, Metals, Resistance, Animal populations, Water pollution effects, Zooplankton, Genetics.

The acute toxicity of copper to the marine copepod Acartia clausi was determined by means of static bioassays. Natural copepod assemblages from two different locations, one from an area polluted with industrial effluents and domestic wastes and another from a relatively uncontaminated area, were compared. Results of metal toxicity tests expressed as 48 h LC50 values indicate a significant difference in the tolerance of copper between the two populations, with the LC50 of the pollution-adapted population higher than that of the population from the uncontaminated area. (EIS-Deal)
W79-00959

THE EFFECTS OF ARSENATE AND ARSENITE ON THE GROWTH AND MORPHOLOGY OF THE MARINE UNICELLULAR ALGAE TETRASELMIS CHUI (CHLOROPHYTA) AND HYMENOMONAS CARTERAE (CHRYSOPHYTA),
Texas A and M Univ., College Station. Dept. of Biology.
N. R. Bottino.
Journal of Experimental Marine Biology and Ecology, Vol. 33, p 153-168, 1978. 13 fig, 12 ref.

Descriptors: *Phytoplankton, *Arsenic compounds, Toxicity, Growth rates, Cytological studies, Absorption, Metabolism, Membrane processes, Salinity, Resistance, Algae, Radioactivity, Techniques, Tracers, *Arsenate, *Arsenite, Mutagens.

The marine phytoplankton algae, Tetraselmis chui and Hymenomonas carterae, were grown in media containing various concentrations of arsenate or arsenite. The effects of arsenic on the algae varied with the oxidation state of the element, its concentration, and the degree of illumination. Arsenate affected mainly algal growth but also cell morphology, whereas arsenite caused only morphological changes. Studies on the incorporation of 74As-arsenate into cells grown in artificial sea water indicated that arsenate was incorporated and later partially released by both T. chui and H. carterae. Both arsenate influx and efflux seemed to be energy-dependent phenomena, because they varied with the degree of illumination. Differences between the rates of uptake and release of arsenic suggested that arsenate undergoes chemical changes after having been transported into the algal cells. (EIS-Deal)
W79-00960

DOUNREAY OIL SPILL: MAJOR IMPLICATIONS OF A MINOR INCIDENT,
Leeds Univ. (England). Wellcome Marine Lab.
R. S. Bowman.
Marine Pollution Bulletin, Vol. 9, p 269-273, 1978. 2 fig, 11 ref.

Descriptors: *Oil, *Oil spills, *Oil pollution, *Shores, Water pollution sources, Organic compounds, Baseline studies, Beaches, Dispersion, Birds, Water pollution effects, Mortality, Toxicity, Tides, *Dispersants.

Few reports of oil spills on an exposed rocky shore have taken into account the background of natural events and the period over which the possible consequences of pollution and its treatment may come to light. This small incident has served as a cautionary tale, illustrating the pitfalls of instant assessment, and the type of baseline experience required for biological interpretation. It has also underlined the continuing inadequacy of the ecological advice available when treatment decisions have to be made. (EIS-Deal)
W79-00961

TOLERANCE TO LEAD IN THE FRESHWATER ISOPOD ASELLUS AQUATICUS,
Nottingham Univ. (England). Dept. of Genetics.
J. Fraser, D. T. Parkin, and E. Verspoor.
Water Research, Vol. 12, p 637-641, 1978. 2 fig, 3 tab, 13 ref.

Descriptors: *Lead, *Adaptation, *Resistance, *Isopods, Crustaceans, Absorption, Genetics, Size, Toxicity, Heavy metals, Water pollution effects, Path of pollutants, Mortality, Animal physiology, Animal metabolism, Enzymes, Animal populations, Evolution, *Asellus.

Samples of the freshwater crustaceans Asellus aquaticus were taken from three sites in the River Trent basin, subjected to different amounts of lead pollution. The survival rate of large and small animals were compared experimentally in a series of different concentrations of lead. Differential survival was recorded between the size classes and the sites that could be explained in terms of genetic adaptation. The significance of the results is discussed in terms of adaptation to environmental pollution. (EIS-Deal)
W79-00962

INDIVIDUAL AND COMBINED TOXICITY OF SOME PETROLEUM AROMATICS TO THE MARINE AMPHIPOD ELASMOPUS PECTENICRUS,
Texas Univ. at Austin, Port Aransas. Port Aransas Marine Lab.
W. Y. Lee, and J. A. C. Nicol.
Marine Biology, Vol. 48, p 215-222, 1978. 1 fig., 6 tab., 28 ref.

Descriptors: *Toxicity, *Aromatic compounds, Oil, *Amphipoda, Fuels, Organic compounds, Mortality, Animal physiology, Animal metabolism, Bioassay, Water pollution effects, Chemical properties.

Toxicity of 4 compounds of petroleum oilsto the marine amphipod Elasmopus pectenicrus has been assessed. Two ephemeral aromatic hydrocarbons, naphtahalene (A) and 1,2,4-trimethylbenzene (B) were more toxic than two persistent aromatics, o-cresol (C) and 0-toluidine (D). The acute toxicity concentrations obtained for individual aromatic compounds were always greater than the actual concentrations found in the water-soluble fractions (WSF) of fuel oils. Results from mixtures of2 or more components indicated that the LC50 levels were primarily determined by the more toxic substances, A and B. Naphthalene and 1,2,4-trimethylbenzene became more toxic to the E. pectenicrus when present in a mixture of more than 2 components, and the toxicity increased with increasing numbers of components present. Synergistic effects, therefore, possibly occur in the whole WSF. No antagonistic effects were observed among the 4 petroleum aromatics.
W79-00963

THE EFFECTS OF DEPRESSED PH ON SPERMATOGENESIS IN FLAGFISH JORDANELLA FLORIDAE,
Sir George Williams Univ., Montreal (Quebec). Dept. of Biological Sciences.
S. M. Ruby, J. Aczel, and G. R. Craig.
Water Research, Vol. 12, p 621-626, 1978. 6 fig, 4 tab, 15 ref.

Descriptors: *Hydrogen ion concentration, *Fish reproduction, *Water chemistry, Cytological studies, Toxicity, Fish physiology, Animal metabolism, Fish eggs, Fish populations, Water quality, Industrial wastes, Air pollution effects, *Flagfish, *Jordanella, Tissue analysis, *Spermatogenesis.

Mature male flagfish Jordanella floridae were continuously exposed to lake water with depressed pH levels of 6.0, 5.5, 5.0, and 4.5 during a 20 day period at 25C. Quantitative histological analysis based upon the final stage of spermatogenesis prior to sperm formation indicated that the production of mature sperm was reduced at all pH values tested by 24.03, 27.03, 37.28 and 35.29% respectively when compared with the control at pH 6.7. Total volume of reproductive tissue relative to somatic tissue within the testes showed similar declines compared to the control. The general decline in spermatogenesis was confirmed morphologically by increased occurrence of tubules devoid of sperm and was particularly evident at pH 4.5. Comparison of the present results with data from female ovaries of the same experiment suggests a higher sensitivity of developing eggs to declining pH when compared with developing sperm. (EIS-Deal)
W79-00964

ASPECTS OF THE ECOLOGY OF PRYMNESIUM PARVUM (HAPTOPHYTA) AND WATER CHEMISTRY IN THE NORFOLK BROADS, ENGLAND,
University of East Anglia, Norwich (England). School of Environmental Sciences.
P. A. Holdway, R. A. Watson, and B. Moss.
Freshwater Biology, Vol. 8, p. 295-311, 1978. 9 fig, 2 tab, 48 ref.

Descriptors: *Phytoplankton, *Fish diseases, *Water chemistry, *Salinity, *Eutrophication, Fishkill, Mortality, Toxicity, Fish physiology, Water quality, Water analysis, Cytological studies, Nitrates, Phosphorus, Nutrients, Chlorophyll, Seasonal, *Prymnesium, River Thurne, Norfolk Broads (England).

Prymnesium parvum, an ichthyotoxic phytoplankter, has been recorded, at times abundantly, in the River Thurne, Norfolk, and its associated Broads. Its occurrence has been apparently more frequent and its polpulation sizes probably larger since the late 1960s than previously and fish mortalities due to it now occur almost annually. The Thurne system is brackish and may have become more so in recent years, exploitation by drainage pumps of a saline water table. Evidence for this is conflicting, but in any case an increase in salinity is unlikely to have made increased Prymnesium growth more likely. Eutrophication of some Broads in the system is most likely to have increased the populations of Prymnesium since the late 1960s. Data are presented on the present water chemistry of the system for comparison with previous records, and on current phytoplankton and Prymnesium crops in different parts of it. EIS-Katz)
W79-00965

CHRONIC SUBLETHAL EFFECTS OF THE WATER SOLUBLE FRACTIONS OF NO. 2

FUEL OILS ON THE MARINE ISOPOD, SPHAEROMA QUADRIDENTATUM,
Texas Univ. at Austin, Port Aransas. Port Aransas Marine Lab.
W. Y. Lee.
Marine Environmental Research Vol. 1, p 5-17, 1978. 4 tab., 25 ref.

Descriptors: *Toxicity, *Oil, *Fuels, *Isopods, Oil pollution, Oil spills, Organic compounds, Reproduction, Fecundity, Growth rates, Mortality, Aquatic population, Water pollution effects, Chemical properties, Juvenile growth stage, Animal physiology, Animal metabolism, *Water-soluble fractions, *Sublethal effects, Chronic effects.

Two series of experiments were carried out to assess the long-term effects of the water soluble fractions (WSF) of Fuel oils on the marine isopod, Sphaeroma quadridentatum. In one experiment, juvenile isopods (one month old) were exposed to sublethal concentrations of a fuel oil room temperatures of 24 plus or minus 1.6 C for nine months. These isopods survived to maturity and reproduced. However, growth rate was adversely affected at concentration greater than or equal to 3% WSF and fecundity was depressed at concentrations grater than or equal to 1% WSF. Survival of offspring in clean seawater was dependent to a large extent on the history of the previous generation. In another experiment, adult Sphaeroma (three months old) were subjected to the WSFs of four fuels oils for one month. Fecundity was depressed at a concentration greater than 15% WSF, regardless of the kind of fuel oil. On the other hand, the number of young produced by the surviving females varied with the type of fuel oil for the same level of WSF. This may be attributed to different relative amounts of toxic components present in the WSF. (EIS-Deal)
W79-00966

PETROLEUM HYDROCARBON RESISTANCE IN THE MARINE WORM NEANTHES ARENACEODENTATA (POLYCHAETA: ANNELIDA), INDUCED BY CHRONIC EXPOSURE TO NO. 2 FUEL OIL,
Texas A and M Univ., College Station. Dept. of Biology.
S. S. Rossi, and J. W. Anderson.
Bulletin of Environmental Contamination and Toxicology, Vol. 20, No. 4, p 513-521, 1978. 2 fig, 2 tab, 20 ref.

Descriptors: Oil, *Fuels, *Annelids, *Resistance, *Oil pollution, Oil spills, Organic compound, Toxicity, Larval growth stage, Juvenile growth stage, Bioassay, Genetics, Animal metabolism, Animal physiology, Membrane processes, Radioactivity techniques, Tracers, Carbon radioisotopes, *Polychaetes, *Crude oil, Water-soluble fraction, *Neanthes, *Naphthalenes.

Three successive generations of the marine polychactous annelid Neanthes arenaceodentata taken from a laboratory population, were continuously exposed to one of three sub-lethal concentrations of No. 2 fuel oil water-soluble-fractions (WSFs). During each generation larvae, juvenile, and immature adult polychaetes were challenged with acute (96 h) doses of No. 2 Fuel Oil or south Louisiana crude oil WSF to test their sensitivity to petroleum hydrocarbons (PHCs). Larvae from all 3 generations, at all exposure concentrations, were no different from control (susceptible) larvae in their sensitivity to the two test oils. F1, F2, and F3 adults exhibited equally increased PHC resistance (x2) compared to control adults. The only evidence of increased resistance beyond that observed in F1 animals, was seen in results of bioassays with juvenile worms, wherein PHC resistance increased from slightly below control levels in F1 juveniles to slightly above control tolerance among F3 juveniles. (EIS-Deal)
W79-00967

SALINITY AND TEMPERATURE TOLERANCE BY NYMPHON GRACILE (LEACH) AND ACHELIA ECHINATA (HODGE) (PYCNOGONIDA),
University Coll. of Swansea (Wales). Dept.of Zoology.
A. S. N. El-Hawawi, and P. E. King.
Journal of Experimental Marine Biology and Ecology, Vol. 33, p 213-221, 1978. 8 fig, 12 ref.

Descriptors: *Salinity, *Water temperature, Resistance, Humidity, Littoral, Animal physiology, Animal Metabolism, Toxicity, Mortality, Seasonal, Habitats, Salt tolerance, *Pycnogonid, *Nymphon, *Achelia.

The tolerance of two species of pycnogonid, Achelia echinata and Nymphon gracile to a range of salinities, temperatures, and relative humidities has been examined. In most instances, No. gracile is more resistant than A. echinata and indeed is found higher in the littoral zone during the warmer summer months and thus likely to be subjected to greater environamental fluctuation. (EIS-Deal)
W79-00968

INFLUENCE OF DOMESTIC WASTES ON ENERGETIC PATHWAYS IN ROCKY INTERTIDAL COMMUNITIES,
California Univ., Irvine. Dept. of Ecology and Evolutionary Biology.
M. M. Littler, and S. N. Murray.
Journal of Applied Ecology, Vol. 15, p 583-595, 1978. 2 fig, 3 tab, 15 ref.

Descriptors: *Productivity, *Energy, *Intertidal area, *Growth rates, *Reproduction, *Nutrients, Biological communities, Domestic wastes, Sewage effluents, Cyanophyta, Bacteria, Aquatic habitat, Trophic level, Water pollution effects, Omnivores, Herbivores, Crustaceans, Mollusks, *Suspension feeders, *Tissue analysis.

The calorific contents of eighteen macroinvertebrates and thirty-six macrophytes were determined in an unpolluted rocky intertidal habitat and in a nearby polluted habitat. Much of the variation in the calorific values of macrophytes was related to life span. The algae that characterized the unpolluted community usually contained comparatively fewer calories per unit weight. These forms had relatively more structural tissues and hence allocated relatively less energy to rapid growth and reproduction. In the polluted habitat, fugitive or opportunistic algal species were more prevalent; these had more rapid growth rates and higher productivites and tended to have relatively high calorific contents. In nearly every case, macroinvertebrates populations exposed to domestic sewage had higher energy contents than did corresponding populations from the unpolluted habitat. Macroinvertebrates in the polluted habitat grazed greater proportions of blue-green algae and bacteria. Omnivores and suspension feeders in the polluted habitat appeared to utilize energy-rich compounds in the sewage effluent; this may explain the greater standing stocks of ominvores and suspension feeders in the peripheral regions of the outfall plume. (EIS-Deal)
W79-00969

METAL ACCUMULATION AND DEPURATION BY THE AMERICAN OYSTER, CRASSOSTREA VIRGINICA,
National Marine Fisheries Service, Milford, CT. Experimental Biological Investigations.
For primary bibliographic entry see Field 5B.
W79-00970

A REVIEW OF THE BIOLOGY OF BRITISH NAIDIDAE (OLIGOCHAETA) WITH EMPHASIS ON THE LOTIC ENVIRONMENT,
University of Wales Inst. of Science and Technology, Cardiff. Dept. of Applied Biology.
M. A. Learner, G. Lochhead, and B. D. Hughes.
Freshwater Biology, Vol. 8, p 357-375, 1978. 1 fig, 2 tab, 116 ref.

Descriptors: *Oligochaetes, *Lotic environment, Reproduction, Periphyton, Bioindicators, Food habits, Benthic fauna, Habitats, Bacteria, Aquatic habitats, Niches, Aquatic life, Aquatic populations, Animal behavior, *Bibliographies, *Reviews, *Naidids.

Naidids live in a wide range of aquatic habitats but are particularly important numerically as part of the benthic fauna of rivers with stony substrates. Major factors determining the distribution and abundance of naidid species are the nature of the substratum and the presence and kind of vegetation. Plants with a highly dissected form, a thick growth habit, and which permit the greatest periphyton development generally support the most abundant naidid populations. Naidids reproduce both asexually and sexually, the former method predominating for most of the year. In general, naidids are most abundant during the summer months when rates of growth and asexual reproduction are stimulated by higher temperatures and a plentiful supply of food. The response of naidid species to different kinds of pollution is varied but generally organic enrichment of rivers which have stony substrates results in a considerable (ten- to twenty-fold) increase in anidid abundance. The importance of Naidiae in relation to pollution surveillance of freshwater is discussed. (EIS-Deal)
W79-00971

ACUTE TOXICITY OF BROMOCHLORINATED SEAWATER TO SELECTED ESTUARINE ESTUARINE SPECIES WITH A COMPARISON TO CHLORINATED SEAWATER TOXICITY,
Virginia Inst. of Marine Sciences, Gloucester Point.
M. H. Roberts, Jr., and R. A. Gleeson.
Marine Environmental Research, Vol. 1, p 19-29, 1978. 3 fig, 1 tab, 23 ref.

Descriptors: *Sea water, *Toxicity, *Chlorination, *Bromine, Chlorine, Estuaries, Mortality, Oysters, Copepods, Lethal limit, Disinfection, Larval growth stage, Juvenile growth stage, Resistance, Atlantic menhaden, Hcemical properties, Ammonia, Chemical degradation, Animal physiology, Fish physiology, *Menidia, Crassostrea, Leiostomus, Palaemonetes, *Bromochlorinated seawater.

The acute toxicity of bromochlorinated estuarine water was determined for several estuarine organisms. The most sensitive species were oysters (Crassostrea virginica) (larvae and juveniles) and copepods (Arcatia tonsa) with 48-h LC50's of 0.10 to 0.21 mg/BrCl/liter. Palaemonetes pugio was most tolerant with a 96-h LC50 of 0.70 mg BrCl/liter. The fish species tested (Menidia menidia, Brevoortia tyrannus and Leiostomus xanthurus) all had a 96-h LC50 of 0.21-0.23 mg BrCl/liter. The BrCl toxicity data are compared with Cl2 toxicity data for the same species. When the LC50's are expressed as equivalents per liter, BrCl is found to be two to four times less toxic than Cl2. The ranking of species in terms of sensitivity is the same for both disinfectants. (EIS-Deal)
W79-00972

EFFECTS OF AERATION IN EARTHEN PONDS ON WATER QUALITY AND PRODUCTION OF WHITE CATFISH,
South Carolina Agricultural Experiment Station, Clemson.
H. A. Loyacano.
Aquaculture. 3(3), p 261-271, 1974.

Descriptors: Dissolved oxygen, Chemical oxygen demand, Air pollution effects, *Aeration, *Catfish, Food, Earthen ponds, Fish production, Water pollution effects, *White catfish.

Comparing effects of air volumes of 0, 6.9 and 10.4 m3/min/ha (0,100 and 150 ft3/min/acre) indicated that greater volumes of air resulted in increased fish production. Increased volumes of air resulted in proportionate increases in dissolved O2 content, allowing greater weights of food to be offered to fish without depleting the O2 content of the pond water. Chemical oxygen demand was inversely related to the volume of air delivered.--Copyright 1975, Biological Abstracts, Inc.
W79-00973

TOXICITY OF COPPER TO THREE ESTUARINE BIVALVES,
Centre of Advanced Study in Marine Biology Porot Novo (India).
A. K. Kumaraguru, and K. Ramamoorthi.
Marine Environmental Research, Vol 1, p 43-48, 1978. 3 tab, 12 ref.

Descriptors: *Copper, *Toxicity, Commercial shellfish, Bioassay, Animal physiology, Animal metabolism, Metals, Mortality, Resistance, Animal behavior, Water pollution effects, Lethal limit, *Static bioassay.

This paper reports on a study of the toxicity of copper to three species of bivalve of commercial food value, Anadara granosa, Meretrix casta, and Crassostrea madrasensis. The LC50 values were estimated as 60 microg Cu/liter for A. granosa, 72 microg Cu/liter, for M. casta, and 88 microg Cu/liter for C. madrasensis subjected to 96-h static bioassay tests after acclimation for a period of four days in the laboratory. The revival rates of bivalves which survived exposure to the LC50 concentrations for the 96-h period (when marked and released in the natural environment) were 67% for A. granosa, and C. madrasensis and 83% for M. casta. The LT50 values for the three bivalves at different concentrations of the metal were also calculated. (EIS-Deal)
W79-00974

ACUTE AND SUBLETHAL TOXICITY OF NAPHTHALENE AND THREE METHYLATED DERIVATIVES TO THE ESTUARINE COPEPOD, EURYTEMORA AFFINIS,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
F. S. Ott, R. P. Harris, and S. C. M. O'Hara.
Marine Environmental Research, Vol 1, p 49-58, 1978. 1 fig, 3 tab, 14 ref.

Descriptors: *Copepods, *Estuaries, *Toxicity, Organic compounds, Chemical properties, Mortality, Animal physiology, Animal metabolism, Reproduction, Fertility, Fecundity, Water pollution effects, Aromatic compounds, Growth stages, *Naphthalenes, Eurytemora, Methyl naphthalenes.

The bi-cyclic aromatic hydrocarbon naphthalene and its alkylated derivatives 2-methylnaphthalene, 2,6-dimethylnaphthalene, and 2,3,5-trimethylnaphthalene were used to investigate possible relationships between increased methylation and toxicity during acute high level and chronic low level exposure experiments using the calanoid copepod Eurytemora affinis. The 24-h LC50 levels indicated an approximate twofold increase in toxicity per methyl group addition. Low levels chronic exposure of E. affinis to the various naphthalenes in sea water concentrations of about 10 microg/liter for the duration of their adult life (maximum twenty-nine days) resulted in significant reductions in length of life, total numbers of nauplii produced and mean brood size. Exposure to all the naphthalenes at this level (approximately 10 microg/liter) resulted in reduced rates of egg production which were, on average, about 50% of those in control animals. Results are discussed in relation to previous work on the fate and effect of petroleum hydrocarbons in marine copepods. (EIS-Deal)
W79-00975

ENRICHMENT OF ESTUARINE PHYTOPLANKTON BY THE ADDITION OF DISSOLVED MANGANESE,
North Carolina Univ. at Chapel Hill. Marine Science Program.
J. G. Sanders.
Marine Environmental Research, Vol 1, p 59-66, 1978. 2 fig, 3 tab, 13 ref.

Descriptors: *Manganese, *Phytoplankton, *Nutrients, *Sewage effluents, *Dissolved oxygen, Estuaries, Effluents, Sewage disposal, Tidal effects, Absorption, Productivity, Water pollution effects, Growth rates, Biochemical oxygen demand, Algae, *Complexation.

The response of natural phytoplankton to additions of excess Mn in an estuary receiving sewage effluents varied with tidal amplitude. During periods of low tidal amplitude, when DOC concentrations were high, carbon uptake by phytoplankton was stimulated. When tidal amplitudes were relatively high, carbon uptake was not affected by Mn addition. The link between high DOC concentrations and stimulation suggests that the Mn addition either relieves a deficiency in available Mn caused by organic complexation or complexes organics from the sewage effluent which are otherwise harmful to phytoplankton productivity. Sewage effluent entering estuaries can be both beneficial and detrimental to the phytoplankton population. Productivity is increased by the addition of inorganic nutrients but may be depressed by the organics contained in the effluent. (EIS-Deal)
W79-00976

ACCUMULATION OF HEAVY METALS IN RAINBOW TROUT SALMO GAIRDNERI (RICHARDSON) MAINTAINED ON A DIET CONTAINING ACTIVATED SEWAGE SLUDGE,
University Coll., Cardiff (Wales). Dept. of Zoology.
S. M. Singh, and P. N. Ferns.
Journal of Fish Biology, Vol 13, p 277-286, 1978. 2 fig, 6 tab, 25 ref.

Descriptors: *Heavy metals, *Rainbow trout, *Absorption, *Sewage sludge, *Activated sludge, *Fish diets, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Cadmium, Mercury, Metals, Laboratory tests, Aquiculture, Bioaccumulation.

Rainbow trout were fed for 10 weeks with a nutritionally balanced diet containing 30% by weight of activated sewage sludge. The whole body concentrations of nine heavy metals (Cr, Mn, Fe, Co, Ni, Cu, Zn, Cd, Pb), together with four major cations (Ca, Mg, Na, K) were determined at the beginning and end of the experiment and at three intermediate stages. Fish fed on the diet containing sewage sludge had significantly elevated levels of Cr, Fe, Ni, Pb and reduced levels of Na and K compared with controls, though the values obtained for all groups fell within the range reported for uncontaminated fish. The Ni and Zn showed a marked increase towards the end of the experiment, suggesting that they might have continued to rise after 70 days. (EIS-Katz)
W79-00977

EVALUATION OF TOXICITY OF SOME INDUSTRIAL WASTES TO FISH BY BIOASSAY,
Shri Govindram Seksaria Technological Inst., Indore (India). School of Studies in Botany.
For primary bibliographic entry see Field 5B.
W79-00978

MERCURY AND THE ESTUARINE MARSH CLAM, RANGIA CUNEATA GRAY. II. UPTAKE, TISSUE DISTRIBUTION, AND DEPURATION,
Texas A and M Univ., College Station. Dept. of Biology.
T. M. Dillon, and J. M. Neff.
Marine Environmental Research, Vol 1, p 67-77, 1978. 5 fig, 1 tab, 35 ref.

Descriptors: *Mercury, *Clams, Animal physiology, Animal metabolism, Path of pollutants, Heavy metals, Salinity, Estuaries, Absorption, Chemical reactions, Commercial shellfish, Tissue analysis, Bioaccumulation, *Depuration, Rangia, Marsh clam.

During a two-week period, Rangia rapidly accumulates mercury (as mercuric chloride) from dilute solution (0.03-0.05 ppm) with the majority being located in gill and mantle tissue. Initial depuration (5 h) in clean seawater is rapid in all tissues. From 10-192 h concentrations of mercury in gill, foot and adductor muscles remain stable while mantle, haemolymph, and viscera levels continue to fluctuate in a manner suggesting internal redistribution of mercury. After eight days of depuration, the viscera contains the most mercury and appears to be the only tissue to increase its proportionate share of the total tissue mercury. After fifteen weeks of depuration, residual mercury in whole clams is about 20% of initial concentrations. Acute decreases in salinity enhance Rangia's ability to depurate mercury. (EIS-Deal)
W79-00979

A KEROSENE-LIKE TAINT IN THE SEA MULLET MUGIL CEPHALUS (LINNEAUS) II. SOME ASPECTS OF THE DEPOSITION AND METABOLISM OF HYDROCARBONS IN MUSCLE TISSUE,
Queensland Dept. of Primary Industries, Hamilton (Australia).
D. W. Connell.
Bulletin of Environmental Contamination and Toxicology, Vol. 20, No. 4, p 492-498, 1978. 3 fig, 4 ref.

Descriptors: Fish physiology, *Mullets, *Absorption, *Lipids, Path of pollutants, Animal metabolism, Organic compounds, Food webs, Chemical properties, Chemical analysis, Gas chromatography, Aromatic compounds, Biodegradation, Taste, Commercial fish, *Tissue analysis, *Alkanes.

The results obtained indicate that the deposition of absorbed hydrocarbons in different segments of the muscle tissue of the sea mullet is proportional to the lipid content of the segment. However, the results give no clear indication as to whether the total lipid content of the muscle tissue of individual fish influences the uptake of hydrocarbons for the environment. Evidence has been presented for different rates of metabolism of the n-alkanes as compared to the iso-alkanes and related compounds. Metabolic processes in the sea mullet result in the preferential degradation of the n-alkanes leaving a hydrocarbon mixture in the sea mullet enriched with iso-alkanes and related compounds. (See also W74-11312) (EIS-Deal)
W79-00980

SUBSTITUTE CHEMICAL PROGRAM. INITIAL SCIENTIFIC REVIEW OF MSMA/DSMA,
Midwest Research Inst., Kansas City, MO.
For primary bibliographic entry see Field 5B.
W79-00982

TAMANO OIL SPILL IN CASCO BAY: ENVIRONMENTAL EFFECTS AND CLEANUP OPERATIONS.
Environmental Protection Agency. Washington, DC. Spill Prevention and Control Board.
For primary bibliographic entry see Field 5G.
W79-00983

ELEOCHARIS ACICULARIS (L) R AND S: THE AUTECOLOGY OF AN ACID TOLERANT SEDGE,
Pennsylvania State Univ., University Park. Dept. of Biology.

P. E. Rothrock, and R. H. Wagner.
Castanea, Vol. 40, No. 4, p 279-289, December, 1975. 4 fig, 2 tab, 16 ref.

Descriptors: *Rooted aquatic plants, *Ecological distribution, Wetlands, *Acid polluted waters, *Eleocharis, Streams, Hydrogen ion concentration, Phosphorus, Carbon dioxide, Aquatic plants.

The sedge Eleocharis acicularis (L) R and S is a mat forming species found in acid polluted waters with pH as low as 2.85. Both terrestrial and submergent forms are known and were shown by reciprocal transplants to be genetically identical and freely interconvertible. The colonies tend to be in backwash areas where water current is mostly negligible and substrate texture is clay-silt. Mats buried under silt are capable of reestablishing themselves by internodal elongation in association with the production of new culms. Measurements of the chemical environment varied widely but phosphorus and CO2 levels were thought to be of possible importance. Reproduction is most often accomplished by asexual fragmentation but seeds, when produced, have a germination rate as high as 86%. (Stihler-Mass)
W79-00984

THE FRESH-WATER POLYCHAETE, MANAYUNKIA SPECIOSA, IN A THERMAL CHANNEL, CLEVELAND HARBOR LAKE ERIE.
Cleveland State Univ., OH. Dept. of Biology.
R. G. Rolan.
Am Midl Nat. 92(1), p 207-213, 1974.

Descriptors: *Lake Erie, Channels, Chlorination, Cleveland, Harbors, Lakes, Light, Manayunkia-speciosa, Ohio, Oxygen, *Polychaetes, Sediment, *Thermal pollution, Water pollution, Hydrogen ion concentration, *Worms.

Six specimens of the fresh-water polychaete, Manayunkia speciosa, wre collected in the Cleveland Harbor Ohio, area of Lake Erie in Sept. and Oct., 1970. Four were found in the inlet channel of the Cleveland Electric illuminating Company's Lakeshore power plant. Two were found in the discharge channel. This is the 1st known occurrence of this unusual worm in a thermal discharge area. Physical data included bottom temperature, dissolved O2, pH, light intensity, and sediment particle size distribution and organic content. Bottom temperatures in the discharge channel averaged 6C higher than in the inlet. Dissolved O2 was never lower than 5 ppm. Sediment in the inlet was predominantly very fine sand with a mean organic content of 8.65% while in the discharge channel the sediment was composed mostly of very fine sand, fine gravel and rocks. Its mean organic content was 7.18%. These data and information from other reports suggest that Manayunkia speciosa had broad tolerance limits for many of the factors commonly measured, such as temperature, dissolved O2, substrate texture and current velocity. It is also apparently able to withstand high levels of chlorination. Its apparent broad tolerance limits and high passive vagility contrast with its restricted distribution.--Copyright 1974, Biological Abstracts, Inc.
W79-00985

A NOTE ON THE EFFECT OF LOWERED TEMPERATURES ON THE SURVIVAL OF EGGS AND FRY OF THE GRASS CARP CTENOPHARYNGODON IDELLA (VALENCIENNES),
Ministry of Agriculture, Fisheries and Food, London (England). Salmon and Freshwater Fisheries Lab.
B. Stott, and D. G. Cross.
J Fish Biol. 5(6), p 649-658, 1973.

Descriptors: Austria, *Carp, Ctenopharyngodon-idella, Effluents, *Eggs, Fry, Grass, Lowered temperature, Powerplants, Seasonal, Spawning, *Survival, *Temperatures, United-Kingdom.

The grass carp has been introduced into many countries and yet self-sustaining populations are known at only 4 sites outside its natural range. While the hydrological conditions apparently necessary for spawning are unlikely to occur in the United Kingdom, the requirements of temperature and perhaps water speed occur locally in heated effluents from power stations. Since most heated effluents tend to layer on the water surface, grass carp eggs laid in effluents would quickly be exposed to falls in temperature of up to about 9C. Experiments carried out in Austria with newly fertilized eggs show that incubation temperatures below 20C result in large scale deaths and deformities which lead to death, although 20 h old fry are not adversely affected. Because summer river temperatures seldom exceed 20C, if spawning did occur it would be unsuccessful at most power station sites. At sites where the power station uses a considerable proportion of the available river flow and where the effluent mixes completely downstream, eggs could possibly survive if temperature were the major criterion for successful development.--Copyright 1974, Biological Abstracts, Inc.
W79-00986

FLOWS OF MATERIALS BETWEEN POORLY FLOODED TIDAL MARSHES AND ESTUARY,
Maryland Univ. Solomons, Chesapeake Biological Lab.
D. R. Heinle, and D. A. Flemer.
Marine Biology, Vol. 35, No. 4, p 359-373, April 30, 1976. 7 fig, 5 tab, 40 ref.

Descriptors: *Tidal marshes, *Cycling nutrients, Nutrients, Flooding, Detritus, Standing crops, Estuaries, Salt marshes, Patuxent estuary.

Flows of particulate carbon, nitrogen, phosphorus, chlorophyll a, crude fiber, carbohydrate, and adenosine tri-phosphate; and of dissolved nitrogen and phosphorus between a marsh and the patuxent estuary, Maryland, were measured over a 2-year period. Virtually no carbon was exchanged, while net flows of nitrogen and phosphorus were from the marsh to the estuary, principally in dissolved forms. Data suggest that fluxes of detritus from stable marshes subjected to modest amounts of tidal flooding are slight, amounting to less than 1% of the maximum areal standing crops.(Maroncelli-Mass)
W79-00987

CONTRIBUTION OF NUTRIENTS FROM SEDIMENTS AND INTERSTITIAL WATER TO COLVILLE RIVER SYSTEM, ALASKA,
Louisiana State Univ., Baton Rouge. Dept. of Marine Science.
For primary bibliographic entry see Field 2K.
W79-00989

IN SITU EXPERIMENTS ON THE DISSOLVED AND COLLOIDAL STATE OF IRON IN AN ACID BOG LAKE,
Michigan Univ., Ann Arbor. School of Natural Resources.
J. P. Koenigs.
Limnology and Oceanographic, Vol 21, No 5, p 674-683, Sept. 1975. 3 fig, 3 tab, 23 ref.

Descriptors: *Bogs, *Iron, *Chemical stratification, Wetlands, Michigan, Anaerobic conditions, Chemical reactions, Water properties, *Acid bog lakes, Ferrous organic complexes, Inorganic iron, North Gate(Michigan).

Inorganic, nonreactive spcies of iron FE (OH) 3, represent minor amounts of the total iron in North Gate lake, in contrast to lakes of pH 6-8. In situ radiochemical analyses revealed that colloidal reactive ferric iron predominates in the oxygenated epilimnion, while dialyzable or dissolved ferrous iron increases with depth. Unlike iron, organic matter is present in a nontransient colloidal state. in acid bog lakes, pH 4-5, ferric iron may be collaoidal not as an inorganic complex (OH(-)) but as reactive Fe (3+) by complexation with the colloidal organic acids. After thermally induced mixing with anaerobic waters, ferric iron is reduced and dissolved; however, some reactive iron remains colloidal, suggesting the presence of a residual ferrous iron complex. (Steiner-Mass)
W79-00990

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME I.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
For primary bibliographic entry see Field 6G.
W79-00998

5D. Waste Treatment Processes

A PROCESS AND PILOT PLANT DESIGN STUDY OF THE ABSORPTION FREEZING VAPOR COMPRESSION PROCESS.
Concentration Specialists, Inc., Andover, MA.
For primary bibliographic entry see Field 3A.
W79-00507

EVALUATION OF ULTRAVIOLET/OZONE TREATMENT OF ROCKY MOUNTAIN ARSENAL (RMA) GROUNDWATER (TREATABILITY STUDY),
Army Engineer Waterways Experiment Station, Vicksburg, MS.
R. E. Buhts, P. G. Malone, and D. W. Thompson.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A052 339, Price codes: A03 in paper copy, A01 in microfiche. Technical Report Y-78-1, January 1978. 38 p, 12 tab, 6 ref, append.

Descriptors: *Chemical wastes, *Water pollution treatment, *Groundwater, *Ultraviolet radiation, *Ozone, Wastes, Colorado, Waste water treatment, *Rocky Mountain Arsenal(Colo), Waste disposal.

Rocky Mountain Arsenal (RMA) has been a chemical manufacturing and chemical demilitarization facility since 1942. Wastes from various chemical processes were discharged into unlined basins until construction of an asphalt-lined evaporation lake in 1955. Repeated contact of rainwater and groundwater with chemical wastes in and beneath the basins has resulted in transport of chemical compounds toward the boundaries of RMA. The groundwater at RMA is known to be contaminated with chlorinated hydrocarbons, organophosphorous, organosulfur, and other organic compounds. This investigation examined the use of ultraviolet/ozone (UV/O3) treatment to reduce the concentration of contaminants in RMA groundwater. Experimental results obtained from treating RMA groundwater with UV light and ozone are given. Two different batch reactors were used, and such parameters as ozone concentration, temperature, and wattage of UV light were varied. Continuous flow experiments were also conducted. In batch experiments, total organic carbon removal ranged from 40 to 90 percent. The concentrations of diisopropylmethylphosphonate (DIMP) and other organic compounds were significantly reduced. In the continuous flow phase of the study, it was possible to remove 93 percent of the DIMP originally present and lower the levels of all other organic contaminants to below detectable limits. (WES)
W79-00538

DEGRADATION OF UREA BY BACTERIA AND ALGAE IN MASS ALGAL CULTURES,
Warsaw Univ. (Poland), Dept. of Environmental Microbiology.
R. J. Chrost, J. Owczarek, and K. Mtusiak.

Acta Microbiologica Polonica, Vol. 7, No. 4, 1975, p 231r236. 4 tab, 14 ref.

Descriptors: *Urea, *Urease, *Bacteria, *Waste water treatment, *Chlorella vulgaris, *Degradation(Decomposition), Algae, Industrial wastes, Fertilizers, Nutrient removal, Beneficial use, Enzymes, Tertiary treatment, Metabolites, Hydrolysis, Biological treatment.

An investigation in which the alga Chlorella vulgaris and accompanying bacteria was used to study the role of urease in urea hydrolysis in nitrogen fertilizer plant wastewater showed no presence of the enzyme in this strain of the alga, but did however demonstrate the importance of urease-containing bacteria in urea removal. Relatively high urea assimilation during initial states of the algal culture appears due to bacterial participation. Urea-hydrolyzing bacteria were subsequently eliminated from the algal culture by algal metabolites, resulting in diminished urea uptake from treated wastes. No changes in pH of the growth medium were observed. No urease activity was found in either intact or sonicated C. vulgaris cells. It can be assumed that this alga strain degrades urea by a process other than hydrolysis. Chemical analyses showed an increase in ammonia with time in the algal culture. Unicellular algae are useful in fertilizer industry wastewater treatment because of their short generation time, small sensitivity to pH changes, and high ability to remove nitrogen loads. In these tests C. vulgaris was maintained in a continuous culture on wastewater containing 1169 mg N/liter as urea. Bacterial composition was observed to change from domination by gram-positive bacteria to domination by gram-negative bacteria. (Lynch-Wisconsin)
W79-00573

ANTIVIRAL SUBSTANCES FROM CALIFORNIA MARINE ALGAE,
California Univ., Berkeley. Naval Biosciences Lab.
For primary bibliographic entry see Field 3C.
W79-00590

DRAFT ENVIRONMENTAL IMPACT STATEMENT, NORTH FULTON COUNTY AND NORTHEAST COBB COUNTY, GEORGIA.
Environmental Protection Agency, Atlanta, GA. Region IV.
For primary bibliographic entry see Field 6G.
W79-00653

INTERIM PLAN FOR WATER QUALITY MANAGEMENT IN THE DENVER METROPOLITAN AREA.
Denver Regional Council of Governments, CO.
For primary bibliographic entry see Field 5G.
W79-00656

PLANNING AND INSTITUTIONAL CONSIDERATIONS IN WASTEWATER TREATMENT FACILITIES PLANNING, BOSTON, MASSACHUSETTS. PHASE 1 STUDY,
Urban Systems Research and Engineering, Inc., Cambridge, MA.
C. Binkley, J. Hudson, and R. Tabors.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 576, Price codes: A10 in paper copy, A01 in microfiche. Prepared for Council on Environmental Quality, Washington, D.C. Final Report. July 16, 1976, 149 p, 47 tab. EQ6AD451.

Descriptors: *Waste water treatment, *Waste water treatment facilities, Water pollution, *Water quality standards, *Water supply, *Water quality, *Planning, Air quality, Water supply, Recreation, Transportation, Costs, Environmental effects, Land use, *Boston(MA), Municipal debt, *Federal Water Pollution Control Act Amendments, Data collection, Coastal zone management, Population projections.

This report covers Phase 1 of a comprehensive case study of the effectiveness of planning for municipal wastewater treatment facilities construction grants under the FWPCA Amendments of 1972. It presents baseline data and an investigation of relevant issues for analyzing the problems of administering a national wastewater treatment program. The study area, around Boston, MA, lies south of the northern extension of BOSWASH conurbation which extends from Norfolk, VA to Lowell, MA. The first part of the report covers the institutional setting for wastewater management in the study area, consisting of state agencies, regional sewer agencies, the Metropolitan Area Planning Council, and the relevant planning bodies in cities and towns. Definitions of the study area are offered with the implications each definition has for wastewater management. Definition by political boundary, sewered areas, or by river basins all offer special problems when assessing the best method for wastewater management. The existing and proposed facilities are discussed but data limitations restricted the scope of the analysis. Existing land use patterns and population projections for the study area are offered and it is noted that two major regional wastewater studies project significantly different figures for population growth and dispersement. The report stresses the need for consistency and for placing the facility construction plans ahead of areawide wastewater management plans. The final chapter discusses the problems of financing necessary water pollution abatement expenditures. The appendices list data sources, bibliography, records of interviews and a glossary of acronyms used. (Coan-NC)
W79-00667

FACILITIES PLAN ADMINISTRATIVE REPORT FOR LEAD-DEADWOOD, SANITARY DISTRICT NO. 1, DEADWOOD, SOUTH DAKOTA.
CH2M Hill, Denver, CO.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 134, Price codes: A15 in paper copy, A01 in microfiche. May 1976. 328 p, 10 fig, 7 tab.

Descriptors: *South Dakota, *Pollution abatement, *Water quality, Sewage treatment, Cities, Constraints, Environment, Facilities, Waste water treatment, Surveys, Project planning, *Lead(SD), *Deadwood(SD).

The plan study consisted of 4 parts: an administrative report presenting the selected waste water management system, with background, alternatives, and basic issues; a technical report for environmental assessment, documenting the steps and decisions evolved; the environmental assessment of the proposed project; and detailed background materials with task reports developed during the planning procedure, supporting the issues and conclusions. A distinction was made between water quality objectives, standards or criteria, and limitations. (Froehlich-ISWS)
W79-00707

PURIFICATION OF AQUEOUS WASTE FROM INITIAL TREATMENT OF WOOL - BY ALLOWING WASTE TO SETTLE, TREATING WITH POLYELECTROLYTES, AND REINTRODUCING SEPARATED DEPOSIT BEFORE FINAL SEPARATION PROCESS.
Soviet Patent SU-558-870. Issued December 12, 1977. Derwent Soviet Inventions Illustrated, Vol. A, No. 32, p 6, September, 1978.

Descriptors: *Patents, *Textile wastes, *Oily water, *Flocculation, *Industrial wastes, Separation techniques, Sedimentation rates, Waste water treatment.

A patent has been granted for a method to treat waste water from the initial stages of wool processing. The process involves settling, treatment with a mixture of polyelectrolytes, and further settling for 24 hrs to separate wool grease and dirt residues. The process is improved by reintroducing the residue into the purified water at a volumetric ratio of 1:1-1.5, stirring the mixture for 2-2.5 hrs, and allowing the mixture to settle again. When the process was applied to 20 liters of separated residue added to an equal volume of purified water, wool fat removal increased from 80 to 93.6% and sulphonal removal from 63 to 78.4%. (Schulz-FIRL)
W79-00727

TREATMENT OF DYEING EFFLUENTS - BY OXYGENATION, ELECTROLYSIS FLOCCULATION, SEPARATION AND FILTRATION, TO YIELD A SOLVENT SUITABLE FOR FURTHER DYEING.
French Patent FR 2368-567. Issued June 23, 1978. Derwent French Patents Abstracts, Vol. A, No. 29, p 4, August, 1978.

Descriptors: *Recycling, *Patents, *Dyes, *Textiles, *Water reuse, *Electrolysis, Flocculation, Industrial wastes, Chemical wastes, Effluents, Waste water treatment, Oxygenation, Separation techniques.

A patent has been issued for an aqueous dyebath solvent formed from effluents of previous dyeing processes. The solvent improves dye quality, reduces wastage, and allows for textile dyeing in a closed circuit to alleviate effluent disposal problems. After oxygenation, effluent collected from previous dyeing is passed to an electrolysis vat where an electric current is fed to a soluble metal anode. This forms a flocculent metal hydroxide which adsorbs impurities from effluent. A decantation filter is used to separate the flocs from the aqueous solvent before replenishment with fresh dyes. (Schulz-FIRL)
W79-00728

PROPYLAMMONIUM HALIDE STARCH DERIVATIVES - USED AS FLOCCULANTS, AND IN TEXTILE AND PAPER INDUSTRIES.
German Patent DS-2055-046. Issued August 3, 1978. Derwent German Patents Abstracts, Vol. A, No. 32, p 2, September, 1978.

Descriptors: *Flocculation, *Chemical reactions, *Pulp and paper industry, *Patents, *Textile wastes, Separation techniques, Industrial wastes, Waste water treatment, Organic compounds.

A patent has been issued for a process to prepare propylammonium halide starch derivatives to be used as flocculating agents in waste water treatment for the textile finishing and paper processing industries. The cation active derivatives are prepared by reaction of starch with quarternary 3-halogeno-2-hydroxypropylammonium halides or the corresponding epoxides in an alkaline medium. The reaction is especially conducted with tertiary amines containing alkyl, alkenyl, aryl or aralkyl groups and halogenohydrins; this is followed by treatment with hydrogen halides and optional conversion to the epoxides. (Schulz-FIRL)
W79-00729

REMOVING FLUORIDE FROM WASTE WATER BY ADDING CALCIUM AND PHOSPHATE - AND PRECIPITATING GERMS OF FLUOR:APATITE OR CALCIUM FLUORIDE.
Netherlands Patent NL-7800-830. Issued July 26, 1978. Derwent Netherlands Patents Report, Vol. A, No. 32, p 4, September, 1978.

Descriptors: *Patents, *Fluorides, *Chemical precipitation, *Chemical wastes, *Industrial wastes, Separation techniques, Waste water treatment, Calcium.

A patent has been granted for a continuous treatement process for waste water from the manufacture of phosphates, fluoroborates, fluoride, fluorine, and fluorosilicates. A calcium compound is added to the waste water stream to provide a molar ratio of calcium to fluoride of at least 5.0. A phosphate compound is added concurrently to maintain a pH of 6.0-11.5. Fluoroapatite and/or calcium fluoride are added as precipitating agents which act to crystallize the fluoride from the continuous stream of waste water. The process is reported to yield residual fluoride concentrations of less than 0.1 ppm, a value considerably lower than the 4.0 to more than 10 ppm obtained by conventional methods. (Schulz-FIRL)
W79-00731

A REVIEW OF CURRENT INTEREST AND RESEARCH IN WATER HYACINTH-BASED WASTEWATER TREATMENT,
Battelle Columbus Lab., OH.
For primary bibliographic entry see Field 5G.
W79-00786

INSTALLATION FOR THE MECHANICAL-BIOLOGICAL PURIFICATION OF WASTE WATER,
Mecafina SA, Schmerikon (Switzerland). (Assignee).
E. Fuchs.
U.S. Patent No. 4,090,965, 13 p, 15 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 970, No 4, p 1424-1425, May 23, 1978.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Water purification, Water pollution treatment, *Biological treatment, Filtration, Equipment.

An installation for the mechanical-biological purification of waste water or sewage incorporates at least one biological stage and one post-clarification stage, the post-clarification stage incorporating a filter. The filter is a drum filter having a filter surface at the inflow or deposit side of it. A suction nozzle extends transversely with respect to the direction of relative movement between the filter surface and the suction nozzle. (Sinha-OEIS)
W79-00825

WASTE WATER PURIFICATION SYSTEM,
The Redux Corp., St. Louis, MO. (Assignee).
T. N. Deane.
U.S. Patent No. 4,092,242, 6 p, 1 fig, 10 ref; Official Gazette of the United States Patent Office, *Vol 970, No 5, p 1855, May 30, 1978.*

Descriptors: *Patents, *Waste water treatment, *Water purification, *Water pollution treatment, Detergents, Water reuse, Emulsifiers, Flocculation, Separation techniques.

Waste water containing synthetic detergents (syndets) such as water soluble sulfonates or ethoxylated alcohols is reclaimed for re-use by emulsifying with a water insoluble, high molecular weight, anionic surface active oil, then breaking the emulsion by conventional physical or chemical methods, thereby producing a coherent floc which occludes the syndet and all insoluble matter suspended in the water, then separating the floc from the purified water in a coherent mass. (Sinha-OEIS)
W79-00831

SEWAGE TREATMENT DEVICE,
Commanche Engineering Corp., Rockwell City, IA. (Assignee).
D. La Gatta.
U.S. Patent No. 4,092,249, 6 p, 7 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 970, No 5, p 1859, May 30, 1978.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Water pollution treatment, Aerobic treatment, Aerobic conditions, Oxygen, Mixing, Septic tanks.

A septic tank is described which permits aerobic breakdown of the sewage, but which does not utilize an air compressor. Instead, the invention utilizes a three compartment tank which permits the sewage to move progressively from a first, to a second, to a third compartment, and which provides for recirculation of the fluid back from the third compartment into the second compartment. When recirculated, the fluid is sprayed into the second compartment which has a vented air chamber above the fluid level. By spraying the fluid into this second compartment, the invention permits the exposure of the fluid to oxygen and causes agitation of the fluid within the second compartment. The sprays are directed in such a manner so as to create a circular agitation motion thereby maintaining many of the solid materials in suspension within the fluid. This permits a more thorough and complete breakdown of the fluids. (Sinha-OEIS)
W79-00833

PROCESS FOR RECOVERING CHEMICALS FROM THE WASTE LIQOURS OF SULFATE CELLULOSE DIGESTION AND THE WASTE WATERS OF BLEACHING,
Ahlstrom (A.) Osakeyhtio, Helsinki (Finland).
K. O. Henricson.
U.S. Patent No. 4,093,508, 6 p, 2 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 971, No 1, p 264, June 6, 1978.

Descriptors: *Patents, *Waste water treatment, *Water pollution treatment, Bleaching wastes, Separation techniques, Industrial water, Water reuse, Cellulose, *Chemicals recovery.

The invention relates to a process for the recovery and reuse of sodium and sulfur chemicals in connection with sulfate cellulose production, whereby the chlorine chemicals are simultaneously removed from the liquor system in the form of sodium chloride. It is possible to use the waste water flow from the bleaching apparatus either entirely or partially for washing the digestion chemicals from cellulose. Besides, the waste flow can be used for dissolving the melt coming from the soda-ash roaster. Or the waste water coming from the bleaching apparatus can be used instead of condensation water and clean water at several other stages of the recovery system for digestion chemicals. In the recovery system a melt from a soda-ash roaster, mainly containing sodium sulfide and sodium carbonate, but also sodium chloride is dissolved and clarified to produce a green liquor containing carbonate sulfide and chlorides. The carbonate is separated from the sulfide and the chlorides then at least part of the sodium chloride is separated from the sulfide in solution, at least part of the carbonate is causticized into hydroxide, and the hydroxide and sulfide in solutions are mixed together in a ratio suitable to form a digestion solution with the desired sulfide content. (Sinha-OEIS)
W79-00837

PREPARATION OF LIQUID FUEL AND NUTRIENTS FROM MUNICIPAL WASTE WATER,
J. L. Lang.
U.S. Patent No. 4,093,516, 5 p, 1 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 971, No 1, p 266, June 6, 1978.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Water pollution treatment, Organic wastes, Fermentation, Separation techniques, Fuels, Ultimate disposal.

An ultimate disposal method for municipal waste, i.e. sewage, to produce useful products comprises the combined steps of separation, either simultaneously or consecutively with a chosen concentration step, of the solid components of the municipal waste, followed by microbial conversion of the soluble contaminants. It is followed by conversion of the separated solid components to a fermentable mixture, fermentation, and separation of the end products of the fermentation to produce a valuable nutrient fraction and a valuable fuel fraction, usable, e.g. as fuel for an internal combustion engine, and purified water. (Sinha-OEIS)
W79-00838

ACTIVATED SLUDGE TREATMENT OF WASTEWATER,
Autotrol Corp., Milwaukee, WI. (Assignee).
C. F. Guarino.
U.S. Patent No. 4,093,539, 7 p, 3 fig, 5 ref; Official Gazette of the United Stages Patent Office, Vol 971, No 1, p 274, June 6, 1978.

Descriptors: *Patents, *Waste water treatment, *Water pollution treatment, *Biological treatment, Activated sludge, Aeration, Equipment.

A method for operating an activated sludge wastewater treatment plant utilizes rotating contactors that are partially submerged in the wastewater in the aeration tank of the activated sludge plant. The rotating contactors provide a fixed film media for the growth of biological life that is present in the recycled activated sludge. The result is a more active biological coating on the fixed film media than is found on such media when used as a separate secondary treatment. In the preferred embodiment, the energy to rotate the contactors is supplied by the same compressed gas that is normally introduced below the surface of the wastewater in the aeration tank of the conventional activated sludge system. (Sinha-OEIS)
W79-00839

METHOD OF THE REMOVAL OF METALLIC MERCURY,
Tecneco, S.p.A., Fano (Italy). (Assignee).
C. Piccinini, and V. Conti.
U.S. Patent No. 4,093,541, 2 p, 1 tab, 3 ref; Official Gazette of the United States Patent Office, Vol 971, No 1, p 274, June 6, 1978.

Descriptors: *Patents, *Waste water treatment, Industrial wastes, Water pollution treatment, *Mercury recovery, Separation techniques, Activated carbon.

A method is disclosed for removing metallic mercury from industrial sewage waters. The improvement is that the polluted liquors are treated with activated carbon having a high specific surface. (Sinha-OEIS)
W79-00840

METHOD AND APPARATUS FOR AMMONIA-NITROGEN REMOVAL BY VACUUM DESORPTION,
Sterling Drug, Inc., New York. (Assignee).
D. S. Ross.
U.S. Patent No. 5,094,544, 20 p, 15 fig, 18 ref; Official Gazette of the United States Patent Office, Vol 971, No 1, p 274-275, June 6, 1978.

Descriptors: *Patents, *Waste water treatment, *Water pollution treatment, *Water quality control, Nitrogen compounds, Ammonia, Gases, Hydrogen ion concentration, Equipment, Vacuum desorption.

The requirements for treating wastewater have steadily increased. One of the requirements which is becoming more important is the elimination of nitrogen from wastewater effluent after the effluent has been processed for removing other polluting constituents. This invention is adapted to operate in many difficult types of processes containing objectionable quantities of ammonia-

nitrogen. Ammonia-nitrogen is present in wastewater as both ammonium ions and ammonia gas. The apparatus and method includes the concept of increasing the pH of the wastewater to a highly basic condition, exposing the wastewater to a vacuum having an absolute pressure at least approaching the vapor pressure of the wastewater proportional to the given temperature whereby ammonia gas is then desorbed from the wastewater, and subsequently absorbing the desorbed ammonia in a body of liquid having a pH substantially less than the highly basic condition of the original wastewater. (Sinha-OEIS)
W79-00841

AERATOR SEWAGE TANK,
H. L. Wilson.
U.S. Patent No. 4,093,549, 7 p, 9 fig, 17 ref; Official Gazette of the United States Patent Office, Vol 971, No 1, p 276-277, June 6, 1978.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Water pollution treatment, Domestic wastes, Aeration, Aerobic conditions, Equipment.

A sewage treatment tank comprises an aeration compartment and a clarifying compartment separated by a vertical baffle-like wall having a steeply inclined lower portion which provides a hopper-like bottom in the clarifier compartment. A submerged pump is provided in the aeration compartment having an outlet discharging into the aeration compartment with specially devised aspirating means for drawing air through the outlet to mix with the raw sewage. It provides a high velocity air fluid stream for aerobic treatment. A separate curved baffle at the bottom of the vertical baffle imparts a circular roll-like stream to the aerating stream and by close spacing to the tank bottom provides a narrow throat-like passage to the clarifier compartment which facilitates drawing any heavy solids back to the aerating compartment for further treatment. A specially devised skimmer to skim solids from the clarifier compartment is provided at the discharge side of the pump. (Sinha-OEIS)
W79-00842

DEVICE FOR PURIFYING SEWER WATER IN SMALL SEWER SYSTEMS,
IFO A. B., Bromolla (Sweden). (Assignee).
U. Paabo, and E. H. Albertsen.
U.S. Patent No. 4,093,551, 4 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 971, No 1, p 277, June 6, 1978.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, Domestic wastes, Water pollution treatment, Chemicals, Sedimentation, Equipment, Siphons.

A device purifies sewer water in a small sewer water system by chemical cleaning of the water which takes place by means of the addition of a liquid containing chemical substances which promote the sedimentation of contaminates in the water. The supply of such a liquid takes place from a receptacle via a tube operating according to the siphon principle. The object of this invention is to provide a purifying device which does not comprise any movable parts but nevertheless automatically controls the supply of the chemical treatment liquid in response to the supply of sewer water. (Sinha-OEIS)
W79-00843

WATER PURIFICATION METHOD,
Westinghouse Electric Corp., Gateway Center, PA. (Assignee).
K. Moeglich.
U.S. Patent No. 4,094,755, 13 p, 14 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 971, No 2, p 683, June 13, 1978.

Descriptors: *Patents, *Waste water treatment, *Water purification, Industrial wastes, Domestic wastes, Suspended solids, Electrolysis, Electrodes, Electric fields, Electric currents, Turbulence, Equipment.

A variety of waste waters are treated by an improved method and apparatus for continuously agglomerating solids of colloidal size or larger suspended in a liquid. The process comprises passing the liquid between spaced electrode plates in the presence of a fluidized bed of conductive particles, and subjecting the liquid suspension to an electric field from alternating current applied across the electrodes through the conductive particles of the bed. The turbulence of the particles has been found to improve conductivity and current efficiency, minimize electrode erosion, and by a mechanical, scrubbing action of the bed particles, minimize fouling or scaling of the electrodes so that the suspending forces of the solids are rapidly and efficiently broken. THe agglomerated solids may then be separated from the liquid by conventional means such as skimming, settling, flotation and the like. (Sinha-OEIS)
W79-00847

METHOD FOR TREATMENT OF OIL-CONTAINING WASTE WATER BY USING AN OIL ADSORBENT,
Koa Oil Co. Ltd., Tokyo (Japan). (Assignee).
K. Noguchi, K. Yoshimura, H. Tanaka, and M. Hayashi.
U.S. Patent No. 4,094,776, 9 p, 1 fig, 7 tab, 3 ref; Official Gazette of the United States Patent Office, Vol. 971, No. 2, p 689, June 13, 1978.

Descriptors: *Patents, *Waste water treatment, *Water pollution treatment, *Oil pollution, Industrial wastes, *Separation techniques, *Adsorption.

An oil adsorbent excellent in the capacity of adsorbing and collecting oils contained in waste waters and capable of being regenerated with ease to restore its activity after it has been used is described. A process for the preparation of the oil adsorbent and a method for treating oil-containing waste waters is also described. A pitch-like substance formed by heat treatment of a heavy hydrocarbon oil, especially one having a volatile matter content of about 10% by weight to about 60% by weight, has a very high oil-adsorbing capacity and after it has been used, the high adsorbing capacity can easily be restored by a simple regenerating method. This pitch-like substance shows an effective oil-adsorbing action when used in the powdery or granular form. (Sinha-OEIS)
W79-00850

PROCESS FOR THE LIQUID PHASE OXIDATION OF ORGANIC SUBSTANCE-CONTAINING EFFLUENTS,
Mitsui Toatsu Chemicals Inc., Tokyo (Japan). (Assignee).
Y. Iwai, M. Okabe, N. Seki, A. Hiai, and S. Iguchi.
U.S. Patent No. 4,094,780, 11 p 3 fig, 4 tab, 10 ref; Official Gazette of the United States Patent Office, Vol. 971, No. 2, p 690-691, June 13, 1978.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Organic wastes, *Water purification, Oxidation, Catalysts, Chemical reactions, Separation techniques, Liquid phase oxidation, Copper catalist, Recovery.

A process for the liquid phase oxidation of an organic substance-containing effluent comprises subjecting the effluent to a liquid phase oxidation treatment in the presence of a copper catalyst at a coppper ion concentration of 50-5000 ppm and also in the presence of an ammonium ion concentration of five or more times the copper ion concentration to oxidize the organic substances in the effluent. The copper catalyst is recovered from the treated effluent for reuse. The recovery of the copper catalyst may be effected either by a process in which the copper catalyst is separated as a precipitate or by a process using a resin adsorption. (Sinha-OEIS)
W79-00853

FEASIBILITY OF RAINWATER COLLECTION SYSTEMS IN CALIFORNIA,
California Univ., Berkeley. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 3B.
W79-00855

INTERFERENCES IN TRACE CONTAMINANT REMOVAL BY ADSORPTION FROM WATER FOR GROUNDWATER RECHARGE,
California Univ., Davis. Dept. of Civil Engineering.
K. McBride.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 386, Price codes: A05 in paper copy, A01 in microfiche. Master of Science Thesis, December 1977. 71 p, 16 fig, 7 tab, 22 ref, 2 append. (California Water Resources Center Project UCAL-WRC-W-510).

Descriptors: *Waste water treatment, *Groundwater recharge, *Phenols, Adsorption, Trace elements, Organic wastes, *Activated carbon, Effluents.

The central problem of this study is whether the advanced treatment of a waste stream containing phenolic compounds is feasible for the purpose of recharging to the groundwater. Removal of trace refractory organics requires use of a physicochemical method. Activated carbon adsorption is a suitable process choice because low level removals of most organic materials can be obtained, the process is inexpensive in comparison to other advanced treatment processes such as reverse osmosis and because considerable field experience has been gained. The project involves the adsorption of a domestic secondary effluent with a known addition of phenol onto activated carbon. Phenol was chosen as a specific contaminant because of its common abundance and it's very low level discharge requirements. Phenolic compounds may be found in the wastewaters derived from almost any oil, petro-chemical or pesticide related activity. These include oil refineries, wood and coal distillations and the manufacture of plastic and chemical products. (Synder-Calif, Davis)
W79-00858

A METHOD OF USING IRRIGATION DRAINAGE WATER FOR POWER PLANT COOLING,
California Univ., Berkeley. Sea Water Conversion Lab.
H. H. Sephton, and G. Klein.
Executive Summary Report, Section A: Process and Pilot Plant Design; Section B: Reduction of Scaling Potential in High-Calcium, High Sulfate Waters. Sept. 1977. (California Water Resources Center Desalination Project) 40 p.

Descriptors: *Irrigation water, *Water reuse, *Salinity, Wastewater, Ion exchange, Powerplants, Engineering structures, Cooling water, *Water softening, Feed water, Ion-exchange resins, Vertical tube foam evaporation.

The accumulation of large quantities of saline water collected from irrigated fields by underground drainage systems presents environmental problems in the South-Western U.S. and Mexico. Research and development projects suggested the technical and economic feasibility for using such wastewaters for power plant cooling, using a novel process sequence comprising (1) ion-exchange resin softening whereby nearly all the hardness is removed, followed by (2) using this softened water as feed to the power plant cooling tower, concentrating it by a factor of 5 to 15; this

cooling tower blowdown is subsequently (3) further concentrated by vertical tube foam evaporation (VTFE) to provide a 20-fold concentrate of the initially softened wastewater which is then adequate to (4) serve as the sole regenerant for the ion-exchange resin used in the initial softening step. Step (4) is carried out in an upflow fluidized bed mode which ensures favorable reaction kinetics by the formation and removal of calcium sulphate precipitate from the resin bed. (Snyder-Calif, Davis)
W79-00862

TESTS OF COAGULANTS FOR THE REDUCTION OF VIRUSES, TURBIDITY, AND CHEMICAL OXYGEN DEMAND,
Tennessee Univ., Knoxville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5F.
W79-00868

VIRUS REMOVAL BY CHEMICAL COAGULATION,
For primary bibliographic entry see Field 5F.
W79-00869

UNIVERSITY OF CALIFORNIA SALINE WATER CONVERSION RESEARCH.
California Univ., Berkeley. Sea Water Conversion Lab., and California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 3A.
W79-00875

EFFECTS OF BROMINE CHLORIDE ON SEVERAL UNICELLULAR GREEN ALGAL SPECIES UNDER LABORATORY CONDITIONS,
Illinois Univ. at Urbana-Champaign. Water Resources Center.
R. W. Randle.
Project Completion Report, April 1978, 40 p, 5 fig, 8 tab, 14 ref, 1 append. OWRT A-072-ILL(1).

Descriptors: *Waste water treatment, *Disinfection, *Chlorination, *Bromine, *Bromine chloride(BrCl), *Chlorophyta, *Algicides, Algal control, Water purification, Sewage treatment, Algae bioassay, Analytical techniques, Water quality control, Water pollution treatment.

The algicidal and algistatic effects of bromine chloride (BrCl) on various species of unicellular green algae were investigated under laboratory conditions using algal bioassay techniques. Concentrations of BrCl was applied as concentration levels likely to be found in field conditions where waste water disinfection is practiced: 0 mg/l (control), 0.20 mg/l, 0.50 mg/l, and 1.0 mg/l. Under the experimental conditions employed and for the species tested, BrCl appears to be an efficient algicidal agent in concentrations of 0.2 to 1.0 mg/l. In this concentration range, as halogen concentration increases, the number of viable algal cells decreases. Recommendations for further study include: (1) definition of the action time needed at particular concentrations; (2) concentration spikes or continuous chemical addition to maintain constant concentration; (3) lower chemical concentrations; (4) variations in response to other temperatures, such as 5 C, 20 C, and 35 C; (5) use of different test species, including Selenastrum capricornutum and Cossmarium spp. (thought to be chlorine resistant and bromine sensitive); (6) photoreactivity tests in light and dark growth conditions; (7) effects of combined residual halogen found in natural waterways; and (8) definition of metabolic modes of action of halogens on various algal species. (Majtenyi-IPA)
W79-00882

REMOVAL OF WOOD-DERIVED TOXICS FROM PULPING AND BLEACHING WASTES,
Institute of Paper Chemistry, Appleton, Wisconsin.
D. B. Easty, L. G. Borchardt, and B. A. Wabers.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-277 785, Price codes: A03 in paper copy, A01 in microfiche. Environmental Protection Agency, Environmental Protection Technology Series EPA-600/2-78-031, 89 p, February, 1978. 19 fig, 14 ref, 23 tab. R-803525-04.

Descriptors: *Pulp wastes, *Waste water treatment, *Toxins, *Bleaching wastes, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Sulfite liquors, Pulp and paper industry, Aerated lagoons, Biological treatment, Biochemical oxygen demand, Activated sludge, Chemical precipitation, Lime, Reverse osmosis, Membrane processes, Membranes, Toxicity, Tertiary treatment, Aluminum, Sulfates, Fatty acids, Resin acids, Ultrafiltration, Guaiacols, Stearic acid, Kraft mills, Sulfite pulp mills.

Wood-derived compounds known to possess toxicity toward fish and to be present in pulp mill effluents include resin and unsaturated fatty acids, their chlorinated analogs, chlorinated guaiacols, and epoxystearic acid. Studies at the Institute of Paper Chemistry (Appleton, Wisconsin) were carried out to assess the extent to which these compounds are removed from pulp mill effluents by different waste treatment systems in use in several locations in the U.S.A. Effluents before and after treatment were analyzed. Nearly all of the waste treatment processes studied removed the toxic compounds effectively. Although primary clarification had little effect on these materials, aerated lagoons and air-activated sludge systems normally removed from 80 to 100% of the resin and fatty acids and their chlorinated analogs from kraft and sulfite mill effluents. Biological treatment facilities which exhibited poorer fatty and resin acid removal were those which received high loadings of fatty and resin acids and BOD. High loadings were apparently reflected also in the lower percentage removal of the toxic compounds in the two oxygen-activated sludge systems studied. Large reductions in concentrations of the toxicants were observed following precipitation processes (lime precipitation and tertiary treatments employing alum). Reverse osmosis demonstrated essentially complete rejection of fatty and resin acids. Performance of pilot ultrafiltration units was either good or marginal, apparently depending upon the type of membrane used. Although chloroform contents of the samples were affected minimally by ultrafiltration, they underwent reductions of from 88 to 98% in all of the other treatment systems studied. (Witt-IPC)
W79-00905

ANALYTICAL REPORT NEW ORLEANS AREA WATER SUPPLY STUDY.
Environmental Protection Agency, Dallas, TX. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5A.
W79-00981

WASTEWATER MANAGEMENT ALTERNATIVES FOR THE SHELLFISH PROCESSING INDUSTRY,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 5G.
W79-00995

5E. Ultimate Disposal Of Wastes

TECHNICAL AND REGULATORY STATUS OF THE PLACEMENT OF SANITARY LANDFILLS IN IOWA,
Iowa State Univ., Ames.
L. V. A. Sendlein, and J. Kipp.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 337, Price codes: A05 in paper copy, A01 in microfiche. Iowa State Water Resources Research Institute Completion Report ISWRRI-87, September 1977. 87 p, 17 fig, 19 tab, 19 ref. OWRT A-065-IA(1).

Descriptors: *Landfills, *Iowa, *Groundwater, *Surveys, *Data collections, *Hydrologic data, *Monitoring, Drainage, Sinks, Flood plains, Leachates, Topography, River basins, Geology, Water resources, Groundwater geology, Hydrogeology, Water pollution, Water pollution sources, Soil contamination, Disposal, Evaluations.

Landfill placement in Iowa was summarized and the effects of landfill placement for three upland Iowa sites were monitored and discussed. Information on landfills was obtained by inspecting all permits and was used to tabulate and analyze landfill sites in Iowa relative to topographic position, monitoring programs, geographic distribution, geologic position, river basins, and hazard zones. Major conclusions were: (1) current regulations favor upland placement of landfills; (2) pollution enclaves formed from floodplain sites are predictable if this location is to be used, the number in any one drainage basin must be considered to protect river water quality; (3) pollution enclaves formed from upland sites are less predictable because of deeper penetration and larger number of geologic units encountered from source to sink; (4) of all sites, 53.1% are in uplands, 41.5% are on valley walls or ravines, and only 5.4% occur on flood plains; (5) approximately 35% of permitted landfills have required monitoring; and (6) there is high correlation between the area of each hazard zone and the present landfills found in each. Data gathered from the three upland sites are somewhat limited but several conclusions were reported: leachate concentrations are lower than those found in previous studies in Iowa floodplain sites; because more activities of man can be met between landfill and groundwater sink, the pollution enclave is more complex in shape and direction of flow; and production of leachate depends more on precipitation than in floodplain sites. (Majtenyi-IPA)
W79-00502

EVALUATION OF ULTRAVIOLET/OZONE TREATMENT OF ROCKY MOUNTAIN ARSENAL (RMA) GROUNDWATER (TREATABILITY STUDY),
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5D.
W79-00538

AN AERIAL SURVEY OF WATERBIRD COLONIES ALONG THE UPPER MISSISSIPPI RIVER AND THEIR RELATIONSHIP TO DREDGED MATERIAL DEPOSITS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 6G.
W79-00542

COLONIAL BIRD USE AND PLANT SUCCESSION ON DREDGED MATERIAL ISLANDS IN FLORIDA; VOL. I: SEA AND WADING BIRD COLONIES,
Seabird Research Inc., Culver City, CA.
For primary bibliographic entry see Field 6G.
W79-00543

COLONIAL BIRD USE AND PLANT SUCCESSION ON DREDGED MATERIAL ISLANDS IN FLORIDA; VOL. II: PATTERNS OF PLANT SUCCESSION,
Seabird Research Inc., Culver City, CA.
For primary bibliographic entry see Field 6G.
W79-00544

UNDERGROUND BIOMASS DYNAMICS AND SUBSTRATE SELECTIVE PROPERTIES OF ATLANTIC COASTAL SALT MARSH PLANTS,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 2I.
W79-00545

AN ASSESSMENT OF THE POTENTIAL IMPACT OF DREDGED MATERIAL DISPOSAL IN THE OPEN OCEAN,
Terco Corp., College Station, TX.
For primary bibliographic entry see Field 5C.
W79-00549

INVESTIGATION OF SUBAQUEOUS BORROW PITS AS POTENTIAL SITES FOR DREDGED MATERIAL DISPOSAL,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
J. D. Broughton.
Available from the National Technical Information Service, Springfield, VA 22161, Price codes: A09 in paper copy, A01 in microfiche. Technical Report D-77-5, May 1977. 190 p, 34 fig, 118 tab, 62 ref.

Descriptors: *Borrow pits, *Submarine canyons, *Dredged material disposal, *Subaqueous disposal areas.

Surveys knowledge of inventories, describes and evaluates the potential for using subaqueous pits, holes, or depressions as dredged material disposal sites. Scope was limited to an investigation of the estuaries, bays, rivers, and continental shelf areas of coasts of the United States, including the Great Lakes. All subaqueous depressions whether caused by dredging, extraction activities, or natural erosional events, were included. Surveys revealed little research has been accomplished on the effects of pits, holes, or depressions on the aquatic environment. However, the degradation of bays, estuaries, and shelf areas, the importance of these locales to the survival and growth of numerous aquatic species, and increasing public awareness in these areas, will probably result in increased research. A subaqueous site inventory resulted in the location of 125 former, existing, or potential subaqueous pits, holes, or natural depressions. Data collected for each of these sites were recorded and compiled along with site location maps. Site data were examined with reference to pertinent literature to obtain qualitative descriptions of the sites. Description of trenches and canyons, beach replenishment or construction aggregate sites, and shell dredging sites were derived in terms of extreme values and average conditions. (WES)
W79-00550

POTENTIAL EFFECTS OF DEEP-WELL WASTE DISPOSAL IN WESTERN NEW YORK,
Geological Survey, Albany, NY. Water Resources Div.
For primary bibliographic entry see Field 5B.
W79-00625

TREATMENT OF DYEING EFFLUENTS - BY OXYGENATION, ELECTROLYSIS FLOCCULATION, SEPARATION AND FILTRATION, TO YIELD A SOLVENT SUITABLE FOR FURTHER DYEING.
For primary bibliographic entry see Field 5D.
W79-00728

COLONIAL NESTING SEA AND WADING BIRD USE OF ESTUARINE ISLANDS IN THE PACIFIC NORTHWEST,
Graham (John) Co., Seattle, WA.
C. F. Peters, K. O. Richter, D. A. Manuwal, and S. G. Herman.
Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-78-17, May 1978. 220 p, 46 tab, 40 fig, 36 ref, 4 append.

Descriptors: *Birds, *Estuarine environment, Islands, *Pacific Northwest U.S., Habitats, *Shore birds, *Wading birds, Dredged material, *Dredged material disposal, *Waste disposal sites, Colonial birds.

Twenty-three natural and dredged material islands were examined in seven locations from Anacortes, Washington, to Coos Bay, Oregon, to establish the relationships between plant communities and use by colonial nesting waterbirds for both types of islands, as well as the actual bird use of dredged material islands in the Pacific Northwest. Nine islands were found to be used for nesting by one or a combination of glaucous-winged gulls, western-glaucous-winged (hybrid) gulls, ring-billed gulls, Caspian terns, and common terns. Colonies of great blue herons were found on two islands 61 and 97 km from the mouth of the Columbia River. Habitat maps were prepared for each island studied and detailed floristic descriptions of each bird colony evaluated. Colony location, breeding phenology, and nesting success were analyzed with respect to existing flora, environmental stress, island physiography, and human disturbance. Results showed that although dredged material deposition influenced an island's physical dimensions, topography, and substrate, plant communities were physiognomically similar to natural islands. Seabird colonization occurred irrespective of dredging history. Nesting populations appeared to be greater in areas of low human disturbances. Colonization and productivity were primarily related to protection from environmental stress. (WES)
W79-00750

AQUATIC DISPOSAL FIELD INVESTIGATIONS, GALVESTON, TEXAS, OFFSHORE DISPOSAL SITE; EVALUATIVE SUMMARY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
T. D. Wright, D. B. Mathis, and J. M. Brannon.
Technical Report D-77-20, May 1978. 89 p, 13 tab, 5 fig, 19 ref, 3 append.

Descriptors: *Environmental effects, *Aquatic environment, Pollutants, Water quality, *Sediments, On-site investigations, Dredged material, *Dredged material disposal, *Waste disposal sites, *Galveston Bay(Tex), Texas, *Offshore disposal, Ocean waste disposal.

Investigated in 1975 and 1976, the physical (sedimentological), chemical, and biological impacts of dredged material disposal at an authorized disposal site offshore Galveston, Tex. A hopper dredge was used for dredging and disposal, and most of the dredged material consisted of clean sand and sandy silt from the Galveston Bay Channel. A small amount of contaminated material from the Texas City Turning Basin was also placed in the disposal site. Results indicate the authorized disposal site was appropriate for the disposal of material from the dredged areas. Sediment movement after disposal was away from the dredged areas; disposition would not occur in navigation channels. As expected, material deposited in the shallow parts of the disposal site had a rather rapid rate of erosion and dispersal, while that placed in the deeper areas tended to remain in place throughout the study period. The chemical impact of disposal on water quality and sedimentological parameters was minimal. Although some changes were observed, these had little, if any, significance. Biological impacts also appeared to be of marginal significance. Changes in the abundance and types of organisms in disposal areas could not be distinguished from changes in reference areas. (WES)
W79-00751

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; AN ENVIRONMENTAL INVENTORY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
S. P. Cobb.
Technical Report D-77-6, May 1978. 119 p, 27 tab, 41 ref, 6 append.

Descriptors: *Environmental effects, *Sedimentation, *Aquatic environment, New York, Dredged material, *Dredged material disposal, *Waste disposal sites, *Eaton's Neck, Long Island Sound(NY).

Investigates the environmental effects of open water dredged material disposal at the Eatons Neck Disposal Site in central Long Island Sound, New York. Environmental conditions are described at the Eatons Neck Disposal Site as they were four years after cessation of disposal operations. Dredged material, building rubble, and other materials were dumped at the site for about 70 years (1900 to 1971); 9,841,000 m3 of dredged sediments were placed at the site from 1954 to 1971. Any effects of the presence of dredged material at the site on nutrients, metals, and other chemical variables in the central sound are minimal and are probably overshadowed by effects of sewage effluents and other river inputs. There were few significant differences in the abundance and composition of the benthic macrofauna between sampling stations located on the dredged material deposit and the reference stations. Results of hydrodynamic, bathymetry, and sediment studies showed no evidence of dispersion of dredged material from the site. Thus it appears that the Eatons Neck site is suitable, from a confinement standpoint, for the disposal of dredged sediments. (WES)
W79-00752

FIELD STUDY OF THE MECHANICS OF THE PLACEMENT OF DREDGED MATERIAL AT OPEN-WATER DISPOSAL SITES,
Yale Univ., New Haven, CT. Dept. of Geology and Geophysics.
H. J. Bokuniewicz.
Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-78-7, April 1978. 2 vols. (Vol 1: Main text and App A-I; 318 p, 8 tab, 29 fig, 18 ref); Vol 2: App J-O).

Descriptors: *Dredged material, *Dredged material disposal, *Waste disposal sites, *Ocean waste disposal.

A field study of the mechanics of the placement of dredged material at five locations: an estuarine site on the Atlantic, one on the Pacific coast, two sites in the Great Lakes, and one in the open ocean. The objective was to observe all the processes by which dredged material is emplaced on the bottom at a disposal site. Instrument arrays were designed to define the transit of dredged material in time and space from the moment of its release until its final deposition. Methods used included optical transmittance, acoustic pulse echo and water flow measurements with instrument arrays, and water sampling by continuous pumping. Additional observations were made to characterize the mechanical properties of the dredged material, its quantity, and the rate at which it is released into the receiving water. Observations demonstrate the dependence of the placement processes on water depth, the currents at the disposal site, and the properties of the dredged material. Accurate, controlled placement is possible under a wide range of disposal site conditions. Control of the placement can be attained through selection of dredging method, design of the containing vessel, and choice of disposal site characteristics. (WES)
W79-00755

INVESTIGATION OF CONTAINMENT AREA DESIGN TO MAXIMIZE HYDRAULIC EFFICIENCY.
Gallagher (Brian J.) and Co., Los Angeles, CA.

Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-78-12, May 1978. 194 p, 7 tab, 81 fig, 78 ref, 5 append.

Descriptors: *Flod characteristics, *Sedimentation, Mathematical models, Computer programs, *Containment areas, *Dredged material disposal, *Waste disposal sites, *Hydraulic efficiency.

Investigates methodologies for improving the hydraulic efficiencies of dredged material containment areas and develops general guidelines for the proper design and operation of containment areas and their inlet and outlet arrangement. Consists of (a) a review of published literature and technical reports, (b) site visits and field tests at ten active disposal areas to obtain recent operational data, (c) development of a mathematical models and computer programs to predict flow patterns and retention times of different containment area configurations, and (d) formulation of a general methodology for the design of efficient containment areas. Adding spur dikes to increase the effective length-to-width ratio, prevent short-circuiting between inlet and outlet, and retard wind-induced circulation was the most economical method of maximizing hydraulic efficiency, particularly for large, square-shaped areas. Other recommendations include the specification of minimum ponding depths based on selective withdrawal principles and the design of long, rectangular weirs to prevent flow concentration and resuspension problems. (WES)
W79-00757

AQUATIC DISPOSAL FIELD INVESTIGATIONS, DUWAMISH WATERWAY DISPOSAL SITE, PUGET SOUND, WASHINGTON; APPENDIX A: EFFECTS OF DREDGED MATERIAL DISPOSAL ON DEMERSAL FISH AND SHELLFISH IN ELLIOT BAY, SEATTLE, WASHINGTON,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
J. R. Hughes, W. E. Ames, and G. F. Slusser.
Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-77-24, May 1978. 105 p, 20 tab, 11 fig, 25 ref, append.

Descriptors: *Environmental effects, *Washington, *Demersal fish, *Shellfish, Dredged material, *Dredged material disposal, *Waste disposal sites, *Duwamish Waterway, Elliott Bay.

This report determines the effects of dredged material disposal on demersal fish and shellfish at the disposal site. A standard Marinovich 'try net' sampled the disposal site and two reference sites. Catches of both fish and shellfish were inconsistent at the three sites with respect to both numbers and species, indicating a seasonal fluctuation in both abundance and composition. Statistical analyses showed that differences in abundance and composition were significant among the different sampling sites and the different sampling periods. However, experimental design and inherent differences among the sampling sites made it difficult to determine whether the catch differences were attributable to effects of the dredged material disposal or population fluctuations due to migratory behavior patterns. It was concluded that the quantity of dredged material dumped during the study did not have a lasting detrimental effect on the demersal fish and shellfish populations at the disposal site. Recommend future studies include a longer time for collecting baseline data, characteristics of the reference sites be more comparable to the disposal site, and disposal operations be conducted in a manner similar to that which is used in actual practice so the results might have general application. (WES)
W79-00759

HABITAT DEVELOPMENT FIELD INVESTIGATIONS, MILLER SANDS MARSH AND UPLAND HABITAT DEVELOPMENT SITE, COLUMBIA RIVER, OREGON; APPENDIX F: POST-PROPAGATION ASSESSMENT OF WILDLIFE RESOURCES ON DREDGED MATERIAL,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
J. A. Crawford, and D. K. Edwards.
Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-77-38, May 1978. 191 p, 13 tab, 2 fig, 66 ref, 4 append.

Descriptors: *Marshes, *Columbia River, *Habitats, *Wildlife, *Wildlife habitats, Plant populations, On-site investigations, *Dredged material, *Waste disposal sites.

Wildlife response to plant propagation on a dredged material island in the lower Columbia River was assessed from July 1976 through August 1977. Plantings were done in late summer and fall of 1976. Data on birds, mammals, and terrestrial macroinvertebrates were collected, analyzed, and compared with data from other regions of the United States. Natural beach, marsh, upland, tree-shrub, planted marsh, and planted upland habitats were examined. The planted marsh was used by fewer bird species than a reference marsh; however, a trend near the end of the study indicated that use of both will eventually be similar. Upland platings apparently increased the number and diversity of species which used adjacent upland areas. Waterfowl fed and nested in the upland plantings, preferring a barley/bentgrass/red clover mix for feeding and a reed canary grass/red fescue/hairy vetch mix for nesting. Few small mammals were traped, but it appeared that the Townsend'S vole population increased in the uplad canary grass/fescue/vetch mix. Macro-invertebrate populations increased on the upland. Platings did not have dramatic effects on the populations. Avian density ad diversity were mostly unaffected. But in some instances, the number and type of species change. (WES)
W79-00760

CHARACTERIZATION OF CONFINED DISPOSAL AREA INFLUENT AND EFFLUENT PARTICULATE AND PETROLEUM FRACTIONS,
University of Southern California, Los Angeles. Environmental Engineering Program.
For primary bibliographic entry see Field 5B.
W79-00763

AQUATIC DISPOSAL FIELD INVESTIGATIONS, COLUMBIA RIVER DISPOSAL SITE, OREGON; EVALUATIVE SUMMARY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
C. G. Boone, M. A. Granat, and M. P. Farrell.
Technical Report D-77-30, May 1978. 100 p, 27 ref, 20 fig, 8 tab, 5 append.

Descriptors: *Aquatic environment, *Columbia River, *Bottom sediments, Sedimentation, Dredged material, *Dredged material disposal, *Waste disposal sites.

Physical data indicate that dredged material deposited in the nearshore zone off the mouth of the Columbia River maintains its identity relative to sorrounding sediments for periods of years and migrates north at a rate of approximately 0. 6 kilometre per year. Chemical data suggest that the release of dredged material at the disposal area has no measurable effect on either ambient water quality or quality of the sediments. Dredged material removed from the Columbia River entrance channel can be characterized as fine to medium sand with insigficant levels of pollutants. Bottom sediments examined from the tidal delta in the region of disposal site B consistently showed higher levels of nutrients and metals than sediments from adjacent sampling sites. Biological studies indicate that the disposal of dredged material had a measurble effect on both the benthic macroinvertebrates and the demersal finfish at the experimental disposal area. Benthic macroinvertebrate stations exposed to direct burial by dredged material had significantly higher diversity values and lower density values than unaffected stadtions. Demersal fish studies indicate that species diversity, species richness, and catch per uit effort indices were depressed following disposal. (WES)
W79-00764

PRODUCTION AND UTILIZATION OF AQUATIC PLANT COMPOST,
Ontario Ministry of the Environment, Rexdale. Water Resources Branch.
For primary bibliographic entry see Field 5G.
W79-00772

HYDRILLA SILAGE PRODUCTION, COMPOSITION AND ACCEPTABILITY,
Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
For primary bibliographic entry see Field 5G.
W79-00773

PREPARATION OF LIQUID FUEL AND NUTRIENTS FROM MUNICIPAL WASTE WATER,
For primary bibliographic entry see Field 5D.
W79-00838

DISTRIBUTION AND ABUNDANCE OF BENTHIC MACROFAUNA IN THE SEWAGE SLUDGE DISPOSAL AREA, NEW YORK BIGHT APEX, FEBRUARY 1975,
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5B.
W79-00930

DISTRIBUTION AND ABUNDANCE OF BENTHIC ORGANISMS IN THE NEW YORK-NEW JERSEY OUTER CONTINENTAL SHELF,
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program Office.
For primary bibliographic entry see Field 5B.
W79-00931

A STUDY OF THE SOURCES, TRANSPORT, AND REACTIONS OF SUSPENDED PARTICLES IN WATERS OF THE NEW YORK BIGHT,
University of South Florida, St. Petersburg. Dept. of Marine Science.
For primary bibliographic entry see Field 5B.
W79-00993

5F. Water Treatment and Quality Alteration

METHODS TO EFFECT COST REDUCTIONS IN MUNICIPAL WATER SYSTEMS,
Mississippi Univ., University Bureau of Business and Economic Research.
For primary bibliographic entry see Field 6C.
W79-00678

TREATMENT CONTROL APPARATUS FOR WATER SYSTEMS,
J. R. Bury.
U.S. Patent No. 4,094,786, 7 p, 7 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 971, No 2, p 693, June 13, 1978.

Descriptors: *Patents, *Water treatment, *Water quality control, *Control systems, Mechanical control, Timing, Instrumentation, Automatic control, Chemical treatment, Liquid feeders.

A control apparatus for liquid water treatment systems has a float sensitive switch; and means for connecting the small tank to the water reservoir so that the water in the small tank drops responsive to a drop in water level in the reservoir. Activation of the float switch causes voltage to flow both to a solenoid operated water valve and an electric motor actuated totalizer having a digital read out. Cam devices are adapted to determine a predetermined time period during which the switch is held closed. The invention permits the direct injection with a high degree of accuracy of those chemical solutions adapted to be added to a water reservoir in relatively high concentration is such manner that the treatment solution injection is proportional only to the total make up of water delivered to the reservoir. (Sinha-OEIS)
W79-00820

SULFUR GAS REMOVING AND SOLID PARTICLE FILTER FOR WELL WATER,
R. J. Kemper.
U.S. Patent No. 4,094,789, 6 p, 5 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 971, No 2, p 694, June 13, 1978.

Descriptors: *Patents, *Water wells, *Water sources, Deep wells, Water purification, *Water treatment, Water quality control, Filters, Sulfur, Gases, Aeration.

A need exists for an apparatus which will be capable of removing sulfur gas from the water pumped at a deep water well and which will also be capable of filtering other impurities out of the water. The filter of this invention includes a structure where jets of water pumped from a deep well are thoroughly commingled with jets of air under pressure. The jets of water and air are impacted against a splash plate to effect further commingling of the air and water. The air is thereafter vented from the water after which the water passes through a filter body for removing solids and other impurities. Substantially all of the gas, a major portion of which may comprise sulfur gas, is driven from the water and whatever small quantity of sulfur gas remains in the water is highly diluted by the air under pressure commingled with the water. (Sinha-OEIS)
W79-00821

SOFTENING UNIT FOR APPLIANCE,
Sta-Rite Industries, Inc., Racine, WI. (Assignee).
E. C. Grout.
U.S. Patent No. 4,090,963, 5 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 970, No 4, p 1424, May 23, 1978.

Descriptors: *Patents, *Water softening, *Water treatment, *Water quality control, Ion exchange, Resins, Domestic water, Regeneration.

A water softening unit positioned between the mixing valve and washing basket of a washing machine includes a housing having a water inlet and outlet and an inlet for the introduction of salt into the housing. A partition divides the housing into a regeneration chamber and an ion-exchange chamber communicating with one another at one end of the partition. A pressure relief valve is located in the partition. A flow restriction valve located between the housing inlet and the regeneration chamber restricts flow through the softening unit when actuated, thereby allowing complete and thorough regeneration. The valve is normally open and when operated manually or otherwise to its alternate or actuated position, it remains in its actuated condition until the regeneration operation is completed. (Sinha-OEIS)
W79-00823

ACID DISPENSER FOR WATER SOFTENER UNIT,
Ecodyne Corp., Lincolnshire, IL. (Assignee).
D. A. Bakken, R. A. Henderson, and E. J. Tischler.
U.S. Patent No. 4,090,964, 5 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 970, No 4, p 1424, May 23, 1978.

Descriptors: *Patents, *Water softening, *Water treatment, Ion exchange, Resins, Iron, Acids, Equipment, Regeneration.

Water softener units utilizing ion exchange resin particles must be regenerated periodically with a brine solution to restore the water hardness removing ability of such particle. When iron is present in the water being treated it is advantageous to include weak acids, such as citric acid, in the regeneration solution. A supply of such acid is stored in a separate container and a metered dose is dispensed into the brine tank during each regeneration cycle of the water softener. The dispenser utilizes a generally hat-shaped diaphragm that flops from one surface of a metering chamber to the opposite surface when acted upon by either pressure or suction. The diaphragm essentially lines one-half of the chamber at a time, and its movement either draws acid into the chamber or expels the acid from the chamber. (Sinha-OEIS)
W79-00824

GEOTHERMAL ACTUATED METHOD OF PRODUCING FRESH WATER AND ELECTRIC POWER,
For primary bibliographic entry see Field 3A.
W79-00826

SEQUESTERING OF CA++ AND MG++ IN AQUEOUS MEDIA USING ZEOLITE MIXTURES,
Union Carbide Corp., New York. (Assignee).
A. F. Denny, A. J. Gioffre, and J. D. Sherman.
U.S. Patent No. 4,094,778, 4 p, 1 fig, 5 ref; Official Gazette of the United States Patent Office, Vol. 971, No. 2, p 690, June 13, 1978.

Descriptors: *Patents, *Water treatment, *Water softening, *Ion exchange, Zeolites, Hardness(Water), Calcium, Magnesium, *Water treatment, Synergistic effects.

The invention relates in general to the removal or sequestration of calcium and magnesium cations from aqueous solutions, and more particularly to the softening of hard water by ion exchange using mixtures of zeolite A and zeolite X. Mixtures of zeolite A and zeolite X containing about 40 to 70 weight per cent of each species are found to exhibit a synergistic effect in the sequestering by ion exchange of calcium and magnesium ions in hard water. These zeolite mixtures can be advantageously used in detergent compositions as substitutes in part or in full for polyphosphate builders. (Sinha-OEIS)
W79-00851

WATER PURIFICATION MEANS AND METHOD,
A. S. Behrman.
U.S. Patent No. 4,094,779, 6 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol. 971, No. 2, p 690, June 13, 1978.

Descriptors: *Patents, *Water treatment, *Water purification, *Water quality, Domestic water, Filtration, Odor, Taste.

A filtration system for purifying a relatively small volume of water and for removing objectionable tastes and odors from drinking water is described. An inverted container of the water to be purified is supported above a filter which in turn is supported above a bottom container for receiving the effluent from the filter. The upper container is provided with an outlet tube which extends into the filter and is provided with means for regulating the flow of water to the filter. The filter holds a disposable filter medium in the form of a thin 'sandwich' of two outer sheets of readily permeable material and a thin inner layer of activated carbon particles between the two outer sheets. In operation, water flows from the upper container through the filter into the bottom container, the rate of flow of water from the upper container being controlled automatically by the lvel of water in the filter. (Sinha-OEIS)
W79-00852

TESTS OF COAGULANTS FOR THE REDUCTION OF VIRUSES, TURBIDITY, AND CHEMICAL OXYGEN DEMAND,
Tennessee Univ., Knoxville. Dept. of Civil Engineering.
S. P. Shelton, and W. A. Drewry.
Journal American Water Works Association - Vol. 65, No. 10, p 627-635. October 1973, 9 fig, 5 tab, 24 ref. OWRT A-018-TENN(5).

Descriptors: *Coagulation, *Viruses, Turbidity, Biochemical oxygen demand, Turbidity, Chemical oxygen demand, *Water treatment, Bacteriophage.

This study attempts to ascertain (1) how effective different chemical coagulants and polyelectrolytes are in virus removal; and (2) how results, using the same primary coagulants, correlate for a relatively unpolluted raw surface water, a moderately polluted surface water, and a secondary wastewater-treatment-plant effluent with respect to virus removal. Aluminum sulfate, ferric chloride, and ferric sulfate are the most promising of the group of primary coagulants tested from the standpoint of f2 bacteriophage remova. These coagulants are effective in the removal of COD, color, suspended solids, and turbidity. Aluminum sulfate is the most effective coagulant, whereas ferric chloride and ferric sulfate are comparable and less effective. The cationic polyelectrolyte tested is not satisfactory as a primary coagulant because of its poor floc formation and settling characteristics as well as its inability to facilitate removal of turbidity and COD. Virus removals with the cationic flocculant were only moderate, Anionic, nonionic, and cationic polyelectrolytes have only minor significance in virus removal. The use of sodium aluminate with aluminum sulfate does cause a marked increase in virus removal. There seems to be promise that a simple mathematical relationship exists between raw-water COD and the optimum dosage of primary coagulants for virus and turbidity removal. The f2 bacteriophage is an excellent virus with which to work and appears very similar to many animal viruses of concern. (Larson-Tenn)
W79-00868

VIRUS REMOVAL BY CHEMICAL COAGULATION,
D. W. York, and W. A. Drewry.
Journal American Water Work Association, Vol 66, No. 12, p 711-716, December 1974. 3 fig, 2 tab, 33 ref. OWRT A-018-TENN(6).

Descriptors: *Coagulation, *Viruses, *Flocculation, Public health, Bacteriophage, Chemical precipitation, *Water treatment.

Water treatment plants must employ a process which will remove and/or inactivate viruses to a high degree in order to protect public health. Conventional water treatment methods including chlorination have not been completely acceptable in regards to virus removal. A comparison was made of the efficiency of virus removal of a wide range of coagulants and coagulant aids. The f2 bacteriophage was used in all experimental work. Standard procedures were used for both flocculation tests (jar tests) and virus enumeration. The test water was obtained from the surface of Fort Loudoun Lake in Knoxville, Tennessee. Aluminum sulfate and ferric chloride were most effective in removing the virus from the test water. Both aluminum sulfate and ferric chloride were capable of removing over 99 percent of the f2 bac-

teriophage. Cationic polyelectrolytes were unsatisfactory as primary coagulants due to their inability to remove turbidity, color, and COD. Cationic, nonionic, and anionic polyelectrolytes as coagulant aids with aluminum sulfate did not significantly increase the performance of the coaulation system above that obtained with aluminum sulfate alone. The addition of a small dose of sodium aluminate with aluminum sulfate did not increase the removal of the f2 bacteriophage but did serve to increase the reduction of COD while building a dense, rapid-settling floc. The colloidal-titration technique appears to give a reasonable indication of the isoelectric point. (Larson-Tenn)
W79-00869

ANALYTICAL REPORT NEW ORLEANS AREA WATER SUPPLY STUDY.
Environmental Protection Agency, Dallas, TX. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5A.
W79-00981

5G. Water Quality Control

EFFECTS OF MECHANICAL MIXING IN RESERVOIRS ON SEASONAL AND ANNUAL GROWTH RATES OF FISHES,
Oklahoma State Univ. Stillwater. School of Biological Sciences.
For primary bibliographic entry see Field 2H.
W79-00514

WASTEFREE TECHNOLOGY, (IN RUSSIAN),
A. V. Pavlov.
Gig Sanit 8, p 8-11, 1976.

Descriptors: Technology, *Industrial wastes, Sewage effluents, *Water pollution control, *Water quality standards, USSR.

Determination of the term wastefree technology, and principles of its classification are given. Plans to create sewage-free industries under inclusion of the reutilization of water supply are discussed. Such reverse water supply systems are already in operation in the Soviet Union in plants of the nonferrous metals, petro-chemical, textile, synthetic polyamide and polyester fiber production industries, and in petroleum refineries. Antipollution measures to protect air from industrial emissions, at present conducted by the iron and steel industry in the Ukrainian SSR (USSR), are outlined.--Copyright 1978, Biological Abstracts, Inc.
W79-00517

EXPERIENCE IN HYGIENIC EXPERTISE OF INDUSTRIAL CONSTRUCTION PROJECTS, (IN RUSSIAN),
Sverdl. Inst. Ind. Hyg. Occup. Dis., Sverdlovsk, USSR.
M. D. Glikshtein, and M. G. Chetaltdinov.
Gig Sanit 1, p 92-95, 1977.

Descriptors: *Public health, Water quality standards, Air pollution, Heating, *Human health, *Water pollution control.

Changes in roles, controls and guidelines of health and hygiene agencies affecting building and reconstruction workers were discussed. Areas of focus were air quality, water sources, waste water, heating, ventilation, detrimental physical factors, illumination and washroom facilities.--Copyright 1978, Biological Abstracts, Inc.
W79-00518

EFFECTS OF ANTIMYCIN ON STREAM INSECTS,
Wisconsin Univ.-Madison. Dept. of Entomology.
For primary bibliographic entry see Field 5C.
W79-00525

POLLUTION IN RUNOFF FROM NONPOINT SOURCES,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W79-00527

EFFECTS OF SOIL INJECTION OF LIQUID DAIRY MANURE ON THE QUALITY OF SURFACE RUNOFF,
Kentucky Water Resources Research Inst., Lexington.
For primary bibliographic entry see Field 5B.
W79-00528

INVESTIGATION OF SUBAQUEOUS BORROW PITS AS POTENTIAL SITES FOR DREDGED MATERIAL DISPOSAL,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5E.
W79-00550

ZOOPLANKTON STANDING CROPS IN THE DISCHARGE OF LAKE FRANCIS CASE, 1966-1972,
Fish and Wildlife Service, Yankton, SD.
For primary bibliographic entry see Field 5C.
W79-00551

A MODEL OF RENEWABLE RESOURCES AND LIMITATION OF DEPOSIT-FEEDING BENTHIC POPULATIONS,
State Univ. of New York at Stony Brook. Dept. of Ecology and Evolution.
For primary bibliographic entry see Field 5C.
W79-00575

ACID LAKE RENOVATION,
Peabody Coal Co., Central City, KY. Regional Lab.
W. A. Rosso.
In: 7th Symposium on Coal Mine Drainage Research, October 18-20, 1977, Louisville, Kentucky, p 61-70. 5 fig, 4 tab, 9 ref.

Descriptors: *Lakes, *Lake restoration, *Acid mine water, *Water pollution treatment, *Limestones, *Acid lakes, Kentucky, Peabody Coal Company, River Queen Mine(KY), Invertebrates, Mine water, Mine drainage, Fish, Insects, Amphibians, Reptiles, Mollusks, Costs, Impoundments, Aquatic plants, Biological communities, Ecosystems.

Five acid lakes created in 1967 during surface coal mining at the Peabody Coal Company's River Queen Mine in Muhlenberg County, Kentucky were successfully restored through treatment with limestone. The treatment applied was 44.8 metric tons of agricultural limestone/ha on problem areas within each lake's watershed, and certain extremely toxic areas caused by extensive waste coal and gob were covered by grading. The limestone was blown over the lake surface using a truck with blower attachment, except at lake 5 where only the watershed was treated. The lakes, all extremely acidic prior to treatment (pH 3.0-4.3), attained the state water quality standard of pH 6.0 within six months, again with the exception of lake 5, which took 18 months. Renovation costs never exceeded estimated costs of draining and filling, and ranged from 10-100% of those costs. Before treatment all lakes were devoid of fish, and fauna consisted primarily of chironomid and ceratopogonid larvae and a few aquatic beetle species. The only aquatic vascular plants were the cattail Typhaslatifolia (all lakes) and narrow-leafed cattail T. angustifolia (lake 2 only). After treatment diverse communities of vertebrates and invertebrates appeared, mostly through natural invasion, but supplemented by fish stocking. Macroinvertebrate orders increased from four to nine; frogs, toads, turtles, and snakes appeared; and wetland birds and mammals appeared or increased. (Lynch-Wisconsin)
W79-00576

TO TELL THE TRUTH: IMPERFECT INFORMATION AND OPTIMAL POLLUTION CONTROL,
Massachusetts Inst. of Tech. Cambridge.
E. Kwerel.
The Review of Economic Studies, Vol 44, October 1977, p 595-601. 2 fig, 1 ref.

Descriptors: *Economics, *Optimization, *Pollution taxes(Charges), *Permits, *Information, *Pollution abatement, Licenses, Public policy, Regulation, Costs, Damages, Equations, Waste disposal, Incentives.

A new pollution control scheme incorporating both effluent charges and licensing is proposed which will induced firms to reveal the true costs of cleaning up pollution. To design an optimal pollution control plan it is necessary to know both the damages resulting from pollution and the costs of reducing pollution; this scheme fulfills the latter requirement. The paper first examines incentives of firms to deceive the regulatory authority when confronted with either a pure licensing or a pure effluent charge policy. The analysis, based on one pollutant, assumes that all waste discharged has same impact regardless of firm, and that government can assign a dollar value to expected damages. The mixed plan is shown to balance exactly the incentive to overstate control costs under licensing with the incentive to understate costs under effluent charges, so that firms are induced to make socialy-optimal reports to the government. The plan consists of: (1) issuance of a fixed stock of transferable licenses, and (2) payment to firms of a subsidy per license in excess of emissions. Given the market price of licenses, the firm seeks to minimize the sum of treatment costs plus license fees minus rebates. The result is that each firm's total costs are minimized when the goverment sets the socially optimal effluent subsidy and stock of licenses. (Lynch-Wisconsin)
W79-00588

ENVIRONMENTAL QUALITY AND GAINS FROM TRADE,
Mannheim Univ. (West Germany).
H. Siebert.
KYKLOS, Vol. 30, No. 4, 1977, p 657-673. 1 fig, 12 ref.

Descriptors: *Economic-environmetal tradeoffs, *Welfare(Economics), *International trade, *Economics, *Environmental economics, *Pollution abatement, *Public policy, Environmental effect, Industry, Mathematical models, Model studies, Pollution taxes(Charges), Air pollution, Equations.

A two-commodity model, with production of the first commodity considered pollution-intensive, is used to assess the extent to which gains from international trade are altered when effects on environmetal quality are considered. Two situations are analyzed: (1) The home country, which has a comparative price advantage in the first commodity, specializes in its production; emissions increase and environmental quality declines, with reduction in overall benefits to society from trade. (2) The home country enacts an appropriate environmental policy, such as emission taxes. Analysis shows that: (2) if a country exports its pollution-intensively produced commodity, its gains from trade are accompanied by a decline in its environmental quality; (2) if an environmental protection policy is enacted under these circumstances, environmental quality will be improved but gains from trade will be reduced; (3) with the introduction of environmental policy, resource use and output in the pollution intensive sector will decline; (4) quantities exported and imported will fall and pollution abatement will increase; (5) there will be an overall

welfare gain from environmental policy as long as marginal social costs of production are higher than the marginal value of the commodity in consumption, or the emission tax is lower than marginal environmental damage. In an open economy emission taxes must be set according to the same rules as in a closed economy (emission tax-marginal environmental damage prevented. (Lynch-Wisconsin)
W79-00589

THE CONTINUING PROBLEM OF NON-NATIVE FISHES IN FLORIDA,
P. L. Shafland.
Fisheries, Vol. 1, No. 6, November-December 1976, p 25. 4 ref.

Descriptors: *Florida, *Fish, *Exotic fish, *Fish control agents, *Biocontrol, Canals, Swamps, Marshes, Ditches, Hoplian malabaricus, Tilapia mariae, Tilapia zillii, Cichlasoma trimaculatum, Betta splendens, Water pollution effects, Environmental effects, Ecosystems.

The number of reproducing populations of non-native fishes in Florida continues to increase, with 25 species and five hybrids verified. Added to those listed by Courtenay, et. al (1974) are: Hoplian malabaricus, Tilapia mariae, T. zillii, Cichlasoma trimaculatum, and Betta splendens. The establishment rate is indicative of south Florida's environmental instability, due primarily to physical alteration of water flow patterns and other forms of aquatic pollution. Introduction of the fish is due to the irresponsibility of a few tropical fish farmers, in some cases; however, T. zillii has been purposely introduced as an aquatic weed biocontrol agent. The South American tigerfish (H. malabaricus), reportedly a voracious piscivore, is potentially the most harmful of these exotic species; the infested area connects with a swamp and open marsh draining into the Little Manatee River. The location of the Tilapia mariae infestation in the Dade County canal system largely precludes renovation. The T. zillii population was located in a small borrow pit south of Miami, which, upon renovation, yielded seven exotic species in addition to T. zillii: T. mariae, T. mossambica, Hypostomus plecostomus, Corydoras sp., Danio malabaricus, Capoeta tetrazona, and Carassium auratus. A remnant population of Cichlasoma trimaculatum probably exists in the Tampa area following an attempted renovation; the species was found to be euryhaline, and had access to saltwater. The population of Siamese fighting fish (Betta splendens) is confined to a small area of Dade County in ditches where renovation is impractical. (Lynch-Wisconsin)
W79-00591

TILAPIA--A MANAGEMENT TOOL FOR BIOLOGICAL CONTROL OF AQUATIC WEEDS AND INSECTS,
Caifornia Univ., Riverside. Div. of Biological Control.
W. J. Hauser, E. F. Legner, R. A. Medved, and S. Platt.
Fisheries, Vol. 1, No. 6, November-December 1976, p 24.

Descriptors: *Tilapia mossambica, *Tilapia zillii, *Biocontrol, *Aquatic weed control, *Insect control, *Fish, Chara, Potamogeton pectinatus, Najas guadalupensis, Myriophyllum spicatum, Mosquitoes, Midges, California, Algal control, Algae, Filamentous algae, Rice, Ponds, Irrigation canals, Ditches, Water temperature.

Two species of the fish Tilapia have been used successfully for biocontrol of several aquatic plant species and mosquitoes and midges. Tilapia have also been cultured as a protein source, and for sport and commercial fising. Tilapia zillii and T. mossambica have been used alone or in combination for aquatic weed and insect control; T. zillii appears more efficient that T. mossambica in control of higher aquatic weeds and chara. Two factors limit use of T. zillii as a weed control agent: (1) it cannot survive low winter water temperatures in irrigation canals and ditches in southern California, where extensive research is underway; and (2) it prefers sago pondweed (Potamogeton pectinatus), southern naiad (Najas guadalupensis), and Chara spp. over Eurasian water milfoil (Myriophyllum spicatum). Because of its temperature requirements, Tilapia is limited to southern states, and in California cultures must be maintained continuously using geothermal artesian water. In waterways where M. spicatum occurs with more preferred weeds, the former may reach nuisance proportions; an integrated control program incorporating both biological and mechanical techniques is being developed. Excellent weed control has resulted with the fish used alone at stocking rates of 1450-2500 fish/ha. In rice ponds a mixed culture of T. zillii and T. mossambica controlled chara, filamentous and mat-forming algae, N. guadalupensis, and P. pectinatus; control was superior to herbicides. (Lynch-Wisconsin)
W79-00592

THE RELATIONSHIP BETWEEN COASTAL-ZONE MANAGEMENT AND OFF-SHORE ECONOMIC DEVELOPMENT,
Southampton Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 6B.
W79-00593

IMPACT OF ENERGY DEVELOPMENT ON COLORADO RIVER WATER QUALITY,
Utah State Univ., Logan. Dept. of Civil and Environmental Engineering.
A. B. Bishop.
Natural Resources Journal, Vol. 17, No. 4, p 649-71, October, 1977. 6 fig, 5 tab.

Descriptors: *Desalination, *Mexico, *Colorado River basin, *Water quality control, Energy, Brines, Saline water, Water pollution sources, Legislation, Comprehensive planning, Protection.

Energy development in the Colorado River Basin has created a broad range of potential water quality problems. Point source pollution is controllable by current water quality laws, such as Public Law 92-500. Related activities, land surface disturbance, air emissions, mining operations, and water withdrawals could also affect water quality. These activities are not as easily controlled. Mexico and the United States consider salinity the chief water quality problem. The future development of compact-apportioned waters in the basin has been analyzed through water and slat mass balance model studies. Total dissolved solid concentrations are seen to increase below Imperial Dam. Thus, by taking water that serves for dilution out of the river, salinity concentrations are more highly affected. Salinity impact from energy development is reduced due to the control strategy of no salt return in the form of highly concentrated brines. The Colorado River Regional Assessment study has estimated this reduction to be on the order of 34 mg/l; the Salinity Forum considered the reduction to be 27 mg/l. When formulating programs designed to meet water quantity and quality committments to Mexico, these effects must be considered. (Spiegel-Florida)
W79-00605

WHERE DO ENVIRONMENTAL LAWS AND REGULATIONS STAND TODAY.,
Environment Information Center, Inc., New York.
L. A. Rich.
Chemical Engineering, Vol. 83, No. 22, p 9, 11, 13, 15, 17, October 18, 1976.

Descriptors: *Legislation, *Federal water pollution control act, *Chemical industry, Water pollution control, Standards, Clean air act, Effluents, Toxins, Environmental effects, Solid wastes, Industrial wastes, Regulation.

The chemical process industry's activities and wastes are claimed to have a great effect on the environment. Accordingly, controlling state and federal agencies are expected to strictly police the industry. The author of this article strongly recommends that each chemical process industry familiarize itself with environmental laws and regulations, both on the state and federal level. In order to aid this process, an overviw of federal legislative developments is presented. The 1972 Federal Water Pollution Control Act (FWPCA) has experienced mole legislative change in 1976 than any other major environmental law. The basic goals of the FWPCA are: (1) drastic reduction of discharged pollutants; (2) achievement of high water quality; and (3) elimination of toxic-pollutants discharge. Pursuant to the FWPCA, six major sets of regulations have been promulgated. These are: (1) National Pollutant Discharge Elimination System; (2) Effluent Guidelines and Standards; (3) Pretreatment Standards; (4) Oil and Hazardous Substances Rules; (5) Ocean-Dumping Rules; and (6) Toxic Pollutant Standards. The changes in these regulations are examined in some detail. In addition, changes in the Clean Air Act and Ambient Standards, the National Environmental Policy Act, solid-waste laws, noise regulations and the Toxic Substances Control Act are discussed. (Quarles-Florida)
W79-00607

THE OTHER WATER POLLUTION (NONPOINT SOURCE POLLUTION),
For primary bibliographic entry see Field 5B.
W79-00614

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1977 (PART 2, DULUTH AND ALEXANDRIA, MINN.).
Hearings, Sucomm. on Environmental Pollution, Comm. on Environment and Public Works, U.S. Senate, June 2, 3, 1977, Serial No. 95-H25, 789 p.

Descriptors: *Federal water pollution control act, *Minnesota, *Water treatment, *Water pollution control, Effluents, Toxins, Federal government, Water pollution, Industries, Technology, Municipal water, Industrial water.

This second in a series of hearings by the Subcommittee on Environmetal Pollution of the Senate Committee on Environmental Pollution ofthe Senate Committee on Environmnent and Public Works involves a comprehensive review of the Federal Water Pollution Control Act. The purpose of the hearings isto determine what, if any, amendments to the Act are necessary. The instant hearing consists of a general review o the issues involved in the Minnesota water pollution program, while focusing specifically on the issues of best available technology for industries, and management of treatment facilities in municipalites. The 1972 law required two phases of pollution control for industrial sources. First phase goals have been almost completely realized. The second phase, based on the best technology achieveable by 1983, is the subject of these hearings. The projected economic and environmental implications are discussed by witnesses representing various perspectives within Minnesota. The second panel of the hearing explores the series of requirements for municipal facilities established by the 1972 Act, and their present application in Minnesota. Specifically, the panel seeks to know whether the requirement of proportionate user charges is necessary to assure protection of the Federal investment. (Quarles-Florida)
W79-00617

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1977 (PART 5, LEMARS, IOWA).
Hearing, Subcomm. on Environmental Pollution, Comm. on Environment and Public Works, U.S. Senate, June 24, 1977, Serial No. 95-H25, 164 p.

Descriptors: *Federal water pollution control act, *United States, *Legislation, *Federal government, Regulation, Water pollution, Pollution abatement, Water quality, Public utilities, Environment, Water policy.

In June, 1977, the United States Senate's Subcommittee on Environmetal Pollution met in LeMars, Iowa, to discuss implementation of the 1972 Federal Water Pollution Conltrol Act (FWPCA) Amendments. This subcommittee, chaired by Senator Edmund Muskie, derives its power from the Senate Committee on Environmental and Public Works. The opening statement was made by Senator John Culver, from Iowa. Senator Culver thought it fitting that the hearing be held in Iowa because of the state's long history of improvement and preservation of water quality. He cited several examples, including the fact that the first succesful wastewater treatment plant west of the Allenghenies was built in Iowa. The Senator discussed cost-sharing programs, soil erosion problems, agricultural productivity, and other topics. In conclusion, he emphasized his desire that the hearing facilitate better understanding of water quality programs in Iowa. After the opening statement, witnesses in many fields, including the dairy and cattle industries, the league of Women Voters, and many others, were given an opportunity to make presentations. Testimony given by these witnesses was entered into the record, along with many graphs and charts pertinent to the discussion. All are included in this document. (Spiegel-Florida)
W79-00618

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1977 (PART 8, WASHINGTON, D.C.).
Hearings Subcomm. on Environmental Pollution, Comm. on Environment and Public Works, U.S. Senate, June 21, 22, 23, 1977, Serial No. 95-H25, 619 p.

Descriptors: *Federal government, *Federal water pollution control act, *Water quality standards, *Evaluation, Legislation, Administrative agencies, Project planning, Cost sharing, Federal project policy, Environment, Public utilities.

In June, 1977, hearings were held before the Subcommittee on Environmental Pollution, a subgroup of the U.S. Senate's Committee on Environmental and Public Works. Chairperson of the Subcommittee was Senator Edmund Muskie. In the senator's opening statement he discussed issues and questions dealing with the Clean Water Act, including recommendations made by the National Commission on Water Quality. He reminded his fellow senators that their task was to focus on 'what may be' the most significant need of the water pollution program--a major revision of the construction grant program. He urged those interested in the program to discuss with the subcommittee the feasibility of a reduced Federal share of projects costs and the validity of reduction of eligible categories for construction grants. William Reilly, former federal Environmental Protection Agency Administrator, considered it now appropo to undertake a mid-term review of the Federal Water Pollution Control Act, a topic of major significance at the hearing. He also encouraged adoption of a system of charges for delayed compliance with the Act. Numerous witnesses were called to discuss these pertinent topics. All testimony is included. (Spiegel-Florida)
W79-00619

SCHISTOSOMIASIS DISTRIBUTION IN THE YEMEN ARAB REPUBLIC (IN RUSSIAN),
Volgogradskii Gosudarstvennyi Meditsinskii Inst. (USSR). Div. of Biology.
For primary bibliographic entry see Field 5C.
W79-00633

IOWA WATER QUALITY MANAGEMENT PLAN: DES MOINES RIVER BASIN,
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 679, Price codes: A18 in paper copy, A01 in microfiche. July 1976, Glossary, 51 tab, 79 fig. See also Supporting Document and other individual Basin reports.

Descriptors: *Planning, *River basins, *Iowa, *Water resources development, *Waste water (pollution), *Waste water treatment, *Water quality management(applied), Agricultural runoff, Urban runoff, Standards, Land use, Zoning, Population, Municipal wastes, Municipal water, Lagoons, Sediment control, Economics, Low flow, Sludge digestion, Sludge disposal, Monitoring, Administration, Recycling, *Des Moines River Basin(IA), River basin planning, Areawide planning, Facilities planning, *Nonpoint pollution sources, Federal water pollution control Act, Sections 303(e), 208 and 201, Point sources, Structural alternatives, Nonstructural alternatives, Waste load allocations, Waste water collection, Secondary treatment, Primary treatment, Advanced waste treatment, Tillage practices, Woodland management.

This basin plan for the Des Moines River Basin, one of six major basins partially located in Iowa, was prepared in fulfillment of Phase I requirements of Section 303 (e) of PL 92-500. This plan includes a determination of existing water quality, inventories of development patterns and basin characteristics, applicable standards, significant point and nonpoint sources of pollution and waste load allocations in the Des Moines River Basin. Findings show that municipal population will increase by 8% to 790,000 by 1990. Only 136 of the 217 incorporated municipalities currently have collection and treatment facilities. Many facilities have no secondary treatment; waste stabilization lagoons serve nearly 50% of the municipalities and a large number of industries. Water quality violations due to point source discharges have been documented at flows well above the 7-Q-10 low flow. Violations at higher stream flows are probably attributable to rural and urban runoff and all lakes and reservoirs in the basin are subject to potential eutrophication from this runoff. Land disposal of municipal sewage sludge is the most economical ultimate disposal method currently being used in the planning area. Waste load allocations show that a significant number of dischargers will be required to provide advanced waste treatment to meet 7-Q-10 low flow standards, especially in the Upper Des Moines and Racoon River sub-basins. It is recommended that the State Water Plan give high priority to water quality. Nonstructural management measures should be considered to enhance and protect water quality. Land disposal of wastewater and municipal sludge should be further studied. Regionalization of facilities should be considered; 201 facilities planning is recommended for 9 specific areas. Structural measures to protect water quality are outlined.
W79-00645

IOWA WATER QUALITY MANAGEMENT PLAN: SUPPORTING DOCUMENT,
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 680, Price codes: A10 in paper copy, A01 in microfiche. July 1976, 167 p, 9 tab, 37 fig, Glossary.

Descriptors: *Planning, *River basins, *Iowa, *Water quality, *Water quality managemet(Applied), *Water quality standards, Agricultural runoff, Urban runoff, Standards, Waste water(Pollution), Municipal wastes, Low flow, Modeling, Solid wastes, River basin planning, Facilities planning, *Nonpoint pollution sources, Waste load allocation, Primary treatment, Secondary treatment, Advanced waste treatment. *Federal water pollution control act, Sections 303(e) and 201, Northeast Iowa River Basin, Cedar-skunk-Des Moines-Southern Iowa and Western Iowa River Basins.

)This volume is a supporting document for river basin plans for six major basins partially located in Iowa--Northeast Iowa, Cedar, Skunk, Des Moines, Southern Iowa, and Western Iowa Basins. Prepared under Section 303(e) of PL 92-500, the plans include a determination of existing water quality, applicable standards and significant point and nonpoint sources of pollution. The plans identify and set forth to correct the water quality problems of each basin. This docment contains general information applicable to the six basins. The information is essentially of a supporting or background nature and was not considered to warrant duplication in each plan. The document covers five general topics: general characteristics, water quality, nonpoint pollution sources, segment analysis methodology and waste load allocation, and treatment alternatives. Included in a discussion of Iowa's general characteristics is a description of climatology, hydrogeology and ground water quality. Under water quality, Iowa's Standards and Stream Classifications are delineated. Available water quality data were gathered and evaluated to present the best available picture of recent Iowa water quality. Existing water quality is described and compared to standards. The problems of nonpoint pollution are addressed, including both characterizations of combined sewer overflows and urban and rural runoffs and the potential pollution from typical sources. The water quality modeling techniques and assumptions used to evaluate the impact of wastewater discharges upon stream quality under low flow conditios are presented in the discussion of segment analysis and waste load allocation methodologies. Finally, alternative treatment processes are described, followed by a general discussion of arrangements for upgrading of existing facilities.
W79-00646

IOWA WATER QUALITY MANAGEMENT PLAN: NORTHEASTERN IOWA BASIN.
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 681, Price codes: A18 in paper copy, A01 in microfiche. July 1976, 45 tab, 56 fig, Glossary.

Descriptors: *Planning, *River basins, *Iowa, *Water resources development, *Waste water(Pollution), *Waste water treatment, *Water quality, *Water quality management(Applied), Agricultural runoff, Urban runoff, Standards, Land use, Zoning, Population, Municipal wastes, Municipal water, Lagoons, Economics, Sediment control, Low flow, Sludge digestion, Sludge disposal, Monitoring, Administration, Recycling, *Northeastern Iowa Basin(IA), River basin planning, Areawide planning, *Nonpoint sources, Federal Water Pollution Control Act, Sections 303(e) and 208, Point sources, Structural alternatives, Non-structural alternatives, Waste load allocations, Waste water collection, Secondary treatment, Primary treatment, Advanced waste treatment, Tillage practices, Woodland management.

This basin plan for the Northeastern Iowa River Basin, one of 6 major basins partially located in Iowa, was prepared in fulfillment of requirements of Section 303(e) of PL 92-500. The plan includes a determination of existing water quality, inventories of development patterns and basin charac-

teristics, applicable standards, significant point and nonpoint sources of pollution and waste load allocations in the Northeastern Iowa Basin. Findings show that the municipal population will increase by 25% to nearly 475,000 by 1990. Only 129 of the 164 incorporated municipalities currently have collection and treatment facilities. Many facilities have no secondary treatment. Waste load allocations indicate that a significant number of dischargers will be required to provide advanced waste treatment to meet 7-Q-10 low flow water quality standards. Land disposal of digested municipal sludge currently is the most economical ultimate disposal method. There are several planning areas in the basin where currently available data are inadequate, including information on combined sewers, infiltration, and BODs and nutrient loadings and assimilative capacities. It is recommended that the State Water Plan give high priority to water quality. Additional qualitative stream monitoring during low flow conditions is suggested, and additional studies of waste load allocations should be made at times other than low flow conditions. More data concerning physical stream characteristics are needed. Complete retention lagoons should be considered where applicable. Consideration should be given to designating the Davenport area as a 208 planning area. The report also recommends that Iowa and Minnesota agree on stream classifications and effluent standards for interstate waterways. Non-structural management measures should be considered. Structural measures to protect water quality are outlined. (Zayac-NC)
W79-00647

IOWA WATER QUALITY MANAGEMENT PLAN: WESTERN IOWA BASIN.
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
Available from the National Technical Information Service, Springfield VA 22161 as PB-264 682, Price codes: A17 in paper copy, A01 in microfiche. July 1976, Glossary, 47 tab, 49 fig.

Descriptors: *Planning, *River basins, *Iowa, *Water resources development, *Waste water(Pollution), *Waste water treatment, *Water quality, *Water quality management(Applied), Agricultural runoff, Urban runoff, Standards, Land use, Zoning, Population, Municipal wastes, Municipal water, Lagoons, Sediment control, Economics, Low flow, Sludge digestion, Sludge disposal, Monitoring, Administration, Recycling, *Western Iowa River Basin(IA), River basin planning, Areawide planning, Facilities planning, *Nonpoint pollution sources, Federal water pollution control act, Sections 303(e), 208 and 201, Point sources, Structural alternatives, Nonstructural alternatives, Waste load allocations, Waste water collection, Secondary treatment, Primary treatment, Advanced waste treatment, Tillage practices.

This basin plan for the Skunk River Basin, on of six major basins partially located in Iowa, has been prepared in fulfillment of Phase I requirements of Sect. 303(e) of PL 92-500. The plan includes a determination of existing water quality, inventories of development patterns and basin characteristics, applicable, standards, significant point and nonpoint sources of pollution and waste load allocations. Findings show that municipal population will increase by 23% to about 360,000 by 1990. 131 of the 148 incorporated municipalities have collections and treatment facilities. Many facilities have no secondary treatment; waste stabilization lagoons serve 47% of the municipalities and a large number of the industries. Water quality violations have been documented at flows higher than the 7-Q-10 low flow. Lakes ad impoundments are subject to potential eutrophication from urban and rural runoff. Land disposal of digested municipal sludge is the most economical method of ultimate disposal. It is recommended that the State Water Plan give high priority to water quality. Additional qualitative stream monitoring during low flow conditins is suggested; additional studies of waste load allocations should be made at times other than low flow conditions to determine nonpoint contributions. More data concerning physical stream characteristics are needed. Complete retention lagoons rather than small mechanized treatment plats should be considered. Two possible new 208 regions should be considered, along with formation of an intergovernmental water quality managemet agency for the Iowa Great lakes region. Regionalization of facilities should be considered; 201 facilities planning is recommended for the Dension area. Nonstructural management measures should be considered. Structural measures are outlined.
W79-00648

IOWA WATER QUALITY MANAGEMENT PLAN: SKUNK RIVER BASIN.
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 683, Price codes: A06 in paper copy, A01 in microfiche. July 1976, Glossary, 39 tab, 22 fig.

Descriptors: *Planning, *River basins, *Iowa, *Water resources development, *Waste water(Pollution), *Waste water treatment, *Water quality, *Water quality management(Applied), Agricultural runoff, Urban runoff, Standards, Land use, Zoning, Population, Municipal wastes, Municipal water, Lagoons, Sediment control, Economics, Low flow, Sludge digestion, Sludge disposal, Monitoring, Administration, Recycling, *Skunk River Basin(IA), River basin planning, Areawide planning, Facilities planning, Federal Water Pollution Control Act, Sections 303(e), 208 and 201, Nonpoint sources, Structural alternatives, Nonstructural alternatives, Waste load allocations, Development, Waste water collection, Secondary treatment, Primary treatment, Advanced waste treatment, Tillage practices, Woodland management.

This basin plan for the Skunk River Basin, one of six major basins partially located in Iowa, has been prepared in fulfillment of Phase I requirements of Section 303 (e) of PL 92-500. The plan includes a determination of existing water quality, inventories of development patterns and basin characteristics, applicable standards, significant point and nonpoint sources of pollution and waste load allocations in the Skunk River Basin. Findings show that municipal population will increase by 39% to nearly 250,000 by 1990. Of 87 incorporated municipalities, only 53 have collection and treatment facilities. Many facilities have no secondary treatment; waste stabilization lagoons serve nearly 50% of the municipalities and a large number of industries. Water quality violations have been documented at flows higher than the 7-Q-10 low flow; all lakes and impoundments in the basin are subject to potential eutrophication from urban and agricultural runoff. Land disposal of digested municipal sludge is currently the most economical means of ultimate disposal. A significant number of dischargers will be required to provide advanced waste treatment to meet 7-Q-10 low flow water quality standards. Except for the Mississippi River, the Skunk River Basin is water quality limited. It is recommended that the State Water Plan give high priority to water quality. Nonstructural management measures should be considered to enhance and protect water quality. Land disposal of wastewater and municipal sludge should be further studied. Regionalization of facilities should be considered where wasteload allocations have indicated; 201 facilities planning is recommended for 5 areas. Structural measures to enhance and protect water quality are outlined.
W79-00649

IOWA WATER QUALITY MANAGEMENT PLAN: SOUTHERN IOWA BASIN.
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 684, Price codes: A14 in paper copy, A01 in microfiche. July 1976, 37 tab, 36 fig, Glossary.

Descriptors: *Planning, *River basins, *Iowa, *Water resources development, *Waste water(Pollution), *Waste water treatment, *Water quality, *Water quality management(Applied), Agricultural runoff, Urban runoff, Standards, Land use, Zoning, Population, Municipal waste, Municipal water, Lagoons, Sediment control, Economics, Low flow, Sludge digestion, Sludge disposal, Monitoring, Administration, Recycling, *Southern Iowa River Basin(IA), River basin planning, Areawide planning, Facilities planning, Federal Water Pollution Control Act, Sections 303(e), 208 and 201, Point sources, Structural alternatives, Nonsturctural alternatives, Waste load allocations, Secondary treatment, Waste water collection, Primary treatment, Advanced waste treatment, Tillage practices, Woodland management.

This basin plan for the Southern Iowa, has been prepared in fulfillment of Phase I requirements of Section 303(e) of PL 92-500. The plan incudes a determination of existing water quality, inventories of development patterns and basin characteristics, applicable standards, significant point and nonpoint sources of pollution and waste load allocations in the Southern Iowa Basin. Findings show that municipal population will increase by 25% to nearly 145,000 by 1990. Only 62 of 132 incorporated municipalities have collection and treatment facilities; many facilities have no secondary treatment. Waste stabilization lagoons serve nearly 51% of the municipalities and a large number of industries. Water quality violations have been documented at flows higher than 7-Q-10 low flows; all lakes and reservoirs in the basin are subject to potential eutrophication from urban and agricultural runoff. Land disposal of digested municipal sludge is the most economical means of ultimate disposal. A significant number of dischargers will be required to provide advanced waste treatment to meet 7-Q-10 low flow water quality standards. It is recommended that the State Water Plan give high priority to water quality. Nonstructural management measures should be considered to enhance and protect water quality. Land disposal of wastewater and municipal sludge should be further studied. Regionalization of facilities should be considered where wasteload allocations have indicated; 201 facilities planning is recommended for 7 areas. There is already a 4-county 208 planning area surrounding Rathburn Lake; no more are recommended. Structural measures to enhance and protect water quality are outlined. (Zayac-NC)
W79-00650

IOWA WATER QUALITY MANAGEMENT PLAN: IOWA-CEDAR RIVER BASIN.
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 685, Price codes: A18 in paper copy, A01 in microfiche. July 1976, 40 tab, 53 fig, Glossary.

Descriptors: *Planning, *River basins, *Iowa, *Water resources development, *Waste water(Pollution), *Waste water treatment, *Water quality management(Applied), Agricultural runoff, Urban runoff, Standards, Land use, Zoning, Population, Municipal wastes, Municipal water, Lagoons, Sediment control, Economics, Low flow, Sludge digestion, Sludge disposal, Monitoring, Administration, Recycling, *Iowa-Cedar River Basin(IA), River basin planing, Areawide planning, Facilities planning, Federal Water Pollution Control Act, Sections 303(e), 208 and 201, Structural alternatives, Nonstructural alternatives, Waste load allocations, Waste water collection, Secondary treatment, Primary treatment, Advanced waste treatment, Tillage practices, Woodland management.

This basin plan for the Iowa-Cedar River Basin, one of six major basins partially located in Iowa, has been prepared in fulfillment of Phase I requirements of Section(e) of PL 92-500. The plan includes a determination of existing water quality, inventories of development patterns and basin characteristics, applicable standards, significant point and nonpoint sources of pollution and waste load allocations in the Iowa-Cedar River Basin. Findings show that municipal population will increase by 19% to about 690,000 by 1990. Of 207 incorporated municipalities, only 133 have collection and treatment facilities. Many facilities have no secondary treatment. Waste stabilization lagoons serve 45% of the basin's municipalities and a large number of industries. Water quality violations have been documented at flows well above the 7-Q-10 low flow, mostly attributable to point source discharges. Violations at high stream flows have also been documented; all lakes and impoundments in the basin are subject to potential eutrophication from rural and urban runoff. Land disposal of digested municipal sludge is the most economical ultimate disposal method in the planning area. A significant number of dischargers will be required to provide advanced waste treatment to meet 7-Q-10 low flow water quality standards. It is recommended that the State Water Plan give high priority to water quality. Non-structural management measures should be considered to enhance and protect water quality. Land disposal of wastewater and municipal sludge should be considered where wasteload allocations have indicated; 201 facilities planning is recommended for 13 areas. Structural measures to protect water quality are outlined. (Zayac-NC)
W79-00651

PROCEEDINGS OF THE FIRST US/USSR SYMPOSIUM ON COMPREHENSIVE ANALYSIS OF THE ENVIRONMENT.
Environmental Protection Agency, Washington, DC. Office of Research and Development.
For primary bibliographic entry see Field 6G.
W79-00654

SEVERAL PROBLEMS OF THE RATIONAL CONSTRUCTION AND EXPLOITATION OF RESERVOIRS AND CANALS AS EXAMPLIFIED BY THE UCHINSKOYE RESERVOIR AND THE MOSCOW CANAL, (IN RUSSIAN),
All-Union Hydrobiological Society, Moscow (USSR).
A. V. Frantsev.
Gidrobiol Zh 12(5), p 13-19, 1976.

Descriptors: Bank, *Canals, Epiboly, Erosion, Exploitation, Fishes, Fodder, Grass, Livestock, Moscow, Plants, Recreation, Reservoir operation, *Reservoirs, Seeding, Trees, Uchinskoye, USSR, *Water pollution.

Examples and methods for biolgical improvement of water quality in supply reservoirs and canals are discussed, including strengthening of banks, tree planting, the seeding of water plants, use of oblique booms, aeration, collection of swimming pollutants, construction of settling tanks in canals, control of epibolies and sowing of fodder grass. The effect of the growth of water plants in shallow waters on the fish population is discussed. Experience in biological amelioration of the Moscow canal and Uchinskoye reservoir (Russian SFSR, USSR) indicate that simple and inexpensive measures can simultaneously halt erosion of banks, improve recreational conditions, provide supplemental feed for livestock and increase the fish productivity of water bodies--Copyright Biological Abstracts, Inc.
W79-00655

INTERIM PLAN FOR WATER QUALITY MANAGEMENT IN THE DENVER METROPOLITAN AREA.
Denver Regional Council of Governments, CO.
Addendum No. 1, July 1971, 22 p, 7 tab, Exhibit.

Descriptors: *Water quality, *Waste water treatment, *Water quality management(Applied), Biochemical oxygen demand, Sludge, Waste, Government, Sewage disposal, Costs, *Denver(CO), *Water quality management, Environmental improvements, Environmental assessment.

This Addendum was prepared at the request of EPA for supplemental information to the original Interim Plan. Five points were raised by EPA and responded to by the Denver Regional Council of Governments (DRCOG). (1) Individual governmental and organizational units and their relationships with the DRCOG should be further defined. Advisory committees have been established under and by DRCOG; the report sets out how these agencies interrelate. (2) A schedule of priorities and costs should be developed for designated improvements in water quality management. DRCOG presents estimated project costs for each improvement area. (3) The original plan should discuss further the impact of the proposed improvements upon existing water quality and water quality standards. Actions taken to gather the necessary data for determining water quality impacts are listed, as well as the proposed improvements by area; the purpose and benefits of each improvement are discussed. (4) Alternative regional treatment plans should be proposed. Reference is made to a previous report in which this issue is examined and data provided. (5) A revised Environmental Statement should be submitted in accordance with 6 specific requirements. DRCOG discusses 6 points presented in its Environmental Assesssment--probable impact, probable unavoidable adverse impacts, alternatives considered, relationship between short-term uses of the environment and enhancement of long-term productivity, irreversible commitment of resources, and public objections based on environmental issues. Additional needed improvements in sewerage systems are presented, by basin area, with estimated costs given for these improvements.
W79-00656

HARBOR AND WATERFRONT DEVELOPMENT PLANNING,
Higher Education Center for Urban Studies, Bridgeport, CT.
For primary bibliographic entry see Field 2L.
W79-00657

A COMPUTER MODEL OF THE POPULATION OF CHIRONOMIDS (IN RUSSIAN),
Akademiya Nauk Latviiskoi SSR, Riga. Inst. of Biology.
For primary bibliographic entry see Field 5B.
W79-00659

UTAH LAKE-JORDAN RIVER HYDROLOGIC BASINS WATER QUALITY MANAGEMENT STUDY. VOLUME I.
Templeton, Linke and Alsup, Salt Lake City, UT.; and Engineering Science, Inc., Berkeley, CA.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 574, Price codes: A19 in paper copy, A01 in microfiche. Prepared for Utah State Department of Social Services, Bureau of Water Quality, June 1975, 84 fig, 86 tab. Sea also Volume II.

Descriptors: *Planning, *Water quality, *Water management(Applied), *Water use, *Water resources development, Management, Population, Land use, Economics, Economic evaluation, Pollutants, Inflow, Infiltration, Waste water treatment, Waste water disposal, Cities, Irrigation, Agricultural runoff, Urban runoff, Surface waters, Utah, Environmental effects, *Utah Lake(UT), *Jordan River(UT), Natural environment, Point sources, Nonpoint sources, Federal Water Pollution Control Act-Section 303(e), Public participation.

This report was prepared in compliance with federal regulations for river basin plans as defined in Section 303(e) of the Federal Water Pollution Control Act Amendments of 1972. The basic purpose of the study was to develop a comprehensive plant that would serve as a framework for future water quality planning and control activities within the Utah Lake-Jordan River hydrologic basins. Information necessary to develop a detailed picture of the study area--including a discussion of the natural environment and a population, land use and economic inventory--is presented first. Present water quality in the rivers and streams is then discussed and sources of pollution-causing wastes are identified. Present and future waste load allocations are estimated and treatment needs determined; alternative ways of handling municipal wastewaters were synthesized and evaluated with regard to cost, environmental factors, feasibility and overall effectiveness. Results of the public participation program are included in the report. The recommended plan first calls for the maintenance of sufficient flow rate levels to maintain a balance of flora and fauna. Point source pollution abatement is given first priority because of its immediate significance. Infiltration and inflow are addressed because of their excessive nature in many collection systems. Recommended plans for municipal wastewater management in 1980 are diagrammed; possible developments of the plans after 1980 are then presented. Some institutional possibilities for administration are discussed. Finally, measures for reducing urban runoff, mitigating the deleterious effects of nonpoint agricultural runoff and minimizing surface water pollution due to irrigation return flow are outlined. (Zayac-NC)
W79-00660

ASSESSING THE SOCIAL IMPACTS OF OIL SPILLS. PROCEEDINGS OF AN INVITATIONAL SYMPOSIUM.
Environmental Protection Agency, Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 726, Price codes: A06 in paper copy, A01 in microfiche. Proceedings of an invitational symposium co-sponsored by the Institute on Man and Science and the U.S. Environmental Protection Agency held at Rensellaerville, New York on September 25-28, 1973, 129 p.

Descriptors: *Oil spills, *Water pollution, *Oil industry, *Economics, *Legislation, *Environmental effects, *Oil pollution, Compensation, Legal aspects, Recreation, Coasts, *Government policies, *Corporations, *Environmental impacts, Social impacts, Political science, Damage.

This report presents the results of an invitational symposium held to encourage the development of techniques and methodologies in the assessment of the social impact of oil spills. It is divided into topic areas which correspond to the individual session themes. These topics include general perspectives on oil spills, EPA's response to oil spills, legal and corporate response to oil spills, public interest groups' attitudes on oil spills and economic and political approaches to the problems caused by oil spills. The participants are from universities, government agencies, international conservation groups, corporations, and research laboratories both here and abroad. A brief narrative account of each session introduces the faculty presentations. These accounts describe the kinds of questions raised by the participants, delineate the major points of debate and discussion, and summarize the group response to the two learning exercises, posed as task team assignments, that were incorporated within the program's format. Two appendices are provided which include articles by environmental specialists not included in the formal program sessions. These articles are on the properties and environmental effects of oil, compensation for oil pollution damages, international activi-

ty responding to oil pollution damage from vessels at sea, and oil and the energy crisis. (Coan-NC)
W79-00661

THE NATIONAL ENVIRONMENTAL POLICY ACT AND FEDERAL WATER RESOURCES PLANNING: EFFECTS AND EFFECTIVENESS IN THE CORPS AND SCS,
Stanford Univ., CA. Dept. of Civil Engineering.
W. W. Hill.
December 1977, 257 p, Report No. IPM-4.

Descriptors: *Decision making, *Planning, *Evaluation, *Water resource planning, Alternative planning, Surveys, Formulation, *National Environmental Policy Act, *Army Corps of Engineers, *Soil Conservation Service, Implementation, Environmental planning.

The study's research objective is to measure changes in water resources planning and decision-making processes induced by the National Environmental Policy Act (NEPA). The water resources agencies examined are the field level offices of the Army Corps of Engineers--preauthorization planning (survey investigations) and the Soil Conservation Service (SCS)--small watershed planning. The research first examines factors which are necessary, but not sufficient, conditions for the achievement of NEPA's objectives. These conditions involve policy level responses and resource commitments which an agency must make if more substantive changes in planning and decision-making are to occur. Following this assessment, the analysis focuses more directly on changes in planning and decision-making. The evaluation focuses on: the perceptions of Corps and SCS field level personnel regarding NEPA's effects and effectiveness; the degree to which the agencies utilize a systematic interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and decision-making; the degree to which NEPA influences both the selection of alternatives considered (formulation) and the selection of a recommended alternative (evaluation); and increased access to and influence on agencies planning and decision-making processes. It is found that NEPA has had an effect on water resources planning and decision-making in the Corps and SCS. (Nessa-NC)
W79-00665

CAPE COD WATER QUALITY MANAGEMENT PLAN.
Massachusetts Water Resources Commission, Westborough. Water Quality Section.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-269 789, Price codes: A05 in paper copy, A01 in microfiche. January 1976, 61 p, 11 tab, 5 fig, 4 append.

Descriptors: *Water quality, *Water quality control, *Water quality standards, *Planning, *Water pollution, *Water management(Applied), *Water pollution control, *Coastal areas, Regulation, Water resources, Land use, Shellfish, Storm runoff, Groundwater, Abatement, Massachusetts, *Cape Cod(MA), *Non-point pollution sources, River basin planning, 208 planning, Marine water resources, Coastal management.

This report describes the status of water quality on Cape Cod, MA. It also presents an inventory of past planning efforts and can be used as a guide for the 208 study authorized in 1976. Cape Cod, an area of 410 sq. miles, has 15 towns with a permanent population of 97,000. Although there are only a few small freshwater streams, ponds and lakes are abundant. Water quality problems exist on Cape Cod but the vast majority of the coastal waters are clean. Of the approximately 12,600 acres of productive shellfish, 350 acres, or 3%, are closed to fishing and swimming for not meeting the assigned classification standards. Some saltwater intrusion of groundwater has occurred in the north Truro-Provincetown area and some areas have high concentrations of iron and manganese in the groundwater. Non-point pollution is the main source of water pollution on Cape Cod. These sources are boating, sanitary wastes from watercraft, oil spillage, drainage from landfill areas and septic tanks, and stormwater. The report briefly describes their impacts. Past efforts at planning for water quality management are recognized and both public and private actions in the conservation of water and land resources are identified. These actions include local enforcement of subsurface disposal regulations; establishment of local regulations to inhibit pond eutrophication; construction or expansion of small collection systems and possible intertown sewer service areas; and construction of pump-out facilities at marinas. The report concludes with a glossary of technical terms and a discussion of the rules and regulations for the establishment of minimum water quality standards and for the protection of the quality and value of water resources. (Coan-NC)
W79-00666

PLANNING AND INSTITUTIONAL CONSIDERATIONS IN WASTEWATER TREATMENT FACILITIES PLANNING, BOSTON, MASSACHUSETTS. PHASE 1 STUDY,
Urban Systems Research and Engineering, Inc., Cambridge, MA.
For primary bibliographic entry see Field 5D.
W79-00667

EVALUATION OF RECIRCULATING SYSTEMS FOR THE CULTURE OF CHANNEL CATFISH,
Memphis State Univ., TN. Dept. of Biology.
N. C. Parker, and B. A. Simco.
In: Proceedings of the 27th Annual Conference, Southeastern Association of Game and Fish Commissioners. p 474-487, 1973. 5 fig, 1 tab, 19 ref. OWRT B-028-TENN(2).

Descriptors: *Fish reproduction, *Recirculating systems, Evaluation, Water reuse, Recycling, Water quality, Water pollution control, Filters, *Channel catfish.

The development of nutritionally complete feeds has permitted the culture of channel catfish under increasingly intensive conditions. Recirculating raceways and tank culture systems have been the subject of several recent investigations. Ten recirculating systems were built at Memphis State University to evaluate their feasibility for the culture of channel catfish. It was concluded that: (1) Self-cleaning settling chambers and final clarifiers remove particulate matter and extend the life of biofilters. Biofilters will quickly detoxify ammonia to less innocuous nitrates. (2) Water quality is limited by system design; the design determines the maximum water quality obtainable when proper management practices are followed. Water quality in a flow-through system is controlled primarily by the rate of inflow. In a recirculating system, water quality is controlled by the fresh water inflow or exchange rate, the flow rate per tank, and the filter size. An increase in any of these variables will result in an increase in water quality. A formula relating water quality with design variables has been prepared. The recirculating systems, designed for this study, have produced in excess of 7 lbs/ft3 per tank and over 5 lbs/ft3 for the entire system. (Larson-Tenn)
W79-00682

CULTURE OF CHANNEL CATFISH IN A HIGH FLOW RECIRCULATING SYSTEM,
Memphis State Univ., TN. Dept. of Biology.
M. C. Broussard, Jr., N. C. Parker, and B. A. Simco.
In: Proceedings of the 27th Annual Conference, Southeastern Association of Game and Fish Commissioners. p 745-750, 1973. 2 fig, 1 tab, 10 ref. OWRT B-028-TENN(3).

Descriptors: *Fish reproduction, High flow, Water reuse, Recycling, *Recirculating systems, Dissolved oxygen, Temperature, Fish diseases, Water quality, *Channel catfish.

Fish production is limited by several factors, such as dissolved oxygen, temperature, disease and the build up of waste products. Although ponds normally support up to 2,000 lb/acre, Greene (1971) increased this carrying capacity to over 20,000 lb/acre by biofiltration and recirculation of the water. This study concluded that greater carrying capacities for the culture of channel catfish in closed recirculating systems can be obtained with high flow rates and filter to tank ratios. A density of 7.2 lb/ft3 was obtained in a 142 day growing period. Both updraft and trickling filters were effective in reducing ammonia levels without the removal of any significant amount of solid materials from the system. Solid wastes quickly clogged filters containing coal slag, but plastic scraps, oyster shells, teflon rings and styrofoam packing material served effectively as filter media. (Larson-Tenn)
W79-00683

DISSIPATION OF HEAT FROM COOLING PONDS,
Bhabha Atomic Research Centre, Bombay (India).
For primary bibliographic entry see Field 5B.
W79-00702

FACILITIES PLAN ADMINISTRATIVE REPORT FOR LEAD-DEADWOOD, SANITARY DISTRICT NO. 1, DEADWOOD, SOUTH DAKOTA.
CH2M Hill, Denver, CO.
For primary bibliographic entry see Field 5D.
W79-00707

MANUAL FOR METHODS OF QUICKLY VEGETATING SOILS OF LOW PRODUCTIVITY, CONSTRUCTION ACTIVITIES,
Midwest Research Inst. Kansas City, MO.
For primary bibliographic entry see Field 4D.
W79-00717

ICHTHYOLOGICAL INVESTIGATION OF THE PROTECTED HABITAT OF THE DANUBIAN SALMON (L.) ON THE RIVER TURIEC)CZECHOSLOVAKIA) AND SUGGESTIONS FOR ITS MANAGEMENT, (IN SLOVAK),
Laboratorium Rybarstva a Hydrobiologie, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 6B.
W79-00718

MECHANICAL DISPERSAL OF OIL STRANDED IN THE LITTORAL ZONE,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
E. H. Owens.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 563-572, May 1978. 12 fig, 2 tab, 19 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Weathering, *Dispersion, *Oil pollution, Water pollution effects, Environmental effects, Littoral, *Outer Continental Shelf, Canada, Coastal processes.

The natural weathering and dispersion of oil stranded in the littoral zone depend on the type and volume of the oil and on the amount of available energy. Energy inputs can be biological, chemical, mechanical, or thermal; however, the single most important input appears to be from mechanical energy (winds, waves, tides, water levels, and ice). The residence time or persistance of stranded oils increase as mechanical energy

levels at the shoreline decrease. The primary inputs of mechanical energy at the shoreline are due to wave action, and energy levels vary depending on the wind regime, fetch areas, and local exposure of a section of coast. In cold or polar climates, energy levels at the shoreline are reduced by the presence of ice on the sea or an ice foot on the beach. This review of the concepts associated with littoral processes, in terms of the mechanical dispersal of stranded oil, provides the basis for estimation of the persistence of oil on shorelines. (Sinha-OEIS)
W79-00725

MEASURES AGAINST STORM WATER POLLUTION, (IN SWEDISH),
Chalmers Univ. of Technology, Goteborg (Sweden). Vatten Inst. Tek.
P. A. Malmquist, and G. Svensson.
Vatten 33(2), p 153-166, 1977.

Descriptors: *Storm water, *Water pollution control, Waste assimilative capacity, Path of pollutants, Mathematical models, Soils, Sweden, Vegetation.

Urban storm water causes by its large volume, its high water flow and its pollutant content considerable costs and damage of different kinds. The storm water pollutants may seriously affect the surface waters, the ground water, the soils and the vegetation and, in the combined system, the sewage treatment plants. The storm water pollutant loads must be decreased if the effects mentioned are to be avoided. This can be done in 2 complementary ways: by reducing the storm water pollutant sources and by decreasing the storm water flows. In a series of research projects at Chalmers University of Technology (Sweden) different methods of decreasing the pollutant loads were investigated. The choice between combined and separated sewage systems is important when the total pollutant load from a city is considered. For an investigation area, the combined system causes higher BOD (biochemical O2 demand) and nutrient loads, but lower suspended solids and heavy metal loads than does the separate system. If the storm water volumes are decreased by local infiltration and percolation, and if retention basins are used, the total pollutant loads can be considerably decreased, especially the loads from the combined system. The storm water pollutant sources are mainly atmospheric fallout, corrosion of building materials, and traffic. The choice of measures and the consequences thereof are a complicated problem, and the use of mathematical models of the planning type facilitates the decision-making. The best effects are obtained if the urban water balance is considered during the planning processes.--Copyright 1978, Biological Abstracts, Inc.
W79-00726

STATE OF THE STOCK OF STURGEON ACIPENSER BAERI BRANDT IN SIBERIAN RIVERS AND MEASURES TO INCREASE THEIR REPRODUCTION, (IN RUSSIAN),
N. P. Votinov, and V. P. Kas'yanov.
Vorp Ikhtiol. 14(5), p 796-805, 1974.

Descriptors: Acipenser-baeri, Artificial breeding, Fisheries, Reproduction, Rivers, Siberian, *Sturgeon, USSR, Water pollution control.

Data are presented on the current state of the stock of sturgeon (A. baeri) in the Ob-irtysh basin and Enisei and Lena Rivers in Siberia (USSR). At present the stock is in a stressed state owing to a decline in reproduction caused by hydropower construction, progressive pollution of the spawning grounds and an irrationally organized fishery. In recent years sturgeon catches have declined 4-fold in comparison to 1960-1964. To increase the abundance of sturgeon in the Ob-Irtysh basin, artificial breeding is necessary. In the Enisei and Lena basins, the fishery must be rationally organized.--Copyright 1975, Biologica Abstracts, Inc.
W79-00736

OILED SEABIRD RESCUE AND CONSERVATION,
Newcastle upon Tyne Univ. (England) Dept. of Zoology.
R. B. Clark.
Journal of the Fisheries Research Board of Canada, Vol 35, No 5, p 675-678, May 1978. 18 ref. From: Proceedings of the Symposium on 'Recovery Potential of Oiled Marine Northern Environments' held at Halifax, Nova Scotia, October 10-14, 1977.

Descriptors: *Oil pollution, *Environmental effects, *Birds, *Rehabilitation, Oil spills, Water pollution effects, *Outer continental shelf, *Torrey Canyon, United Kingdom, Petroleum hydrocarbons, Marine birds, Uria aalge, Alca torda.

Attempts were made to clean and rehabilitate nearly 8000 oiled birds (maily auks) following the wreck of the Torrey Canyon. This was an almost total failure and a Research Unit on the Rehabilitation of Oiled SEabirds was established in Newcastle upon Tyne to devise effective tratment methods. This has involved a study of the mechanism of water-repellency in seabird plumage and led to the developent of cheap, effective cleaning methods and full recovery of the birds within 2-3 wk of capture. These methods have been used successfully on small numbers of birds y amateurs and also operationally on larger numbers by the Research Unit. There have been only few ringing returns but at least some of the cleaned birds became reintegrated with the breeding populations after release. Even with appropriate organization and facilities it is doubtful whether the rescue and treatment of oiled birds can make a material contribution to seabird conservation, but there is often strong public pressure for the treatment of oiled birds and the development of suitable techniques makes this possible. (Sinha - OEIS)
W79-00740

RECOLONIZATION OF ROCKY SHORES IN CORNWALL AFTER USE OF TOXIC DISPERSANTS TO CLEAN UP THE TORREY CANYON SPILL,
Marine Biological Association ofthe United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 5C.
W79-00741

NO. 2 FUEL OIL SPILL IN BOURNE, MASSACHUSETTS: IMMEDIATE ASSESSMENT OF THE EFFECTS ON MARINE INVERTEBRATES AND A 3-YEAR STUDY OF GROWTH AND RECOVERY OF A SALT MARSH,
Woods Hole Oceanographic Institution, MA; and Marine Biological Lab., Woods Hole, MA.
For primary bibliographic entry see Field 5C.
W79-00744

RECOVERY OF BENTHIC MACROFAUNA FROM CHRONIC POLLUTION IN THE SEA AREA OFF A REFINERY PLANT, SOUTHWEST FINLAND,
Abo Akademi, Turko (Finland). Inst. of Biology; and Turku Univ. (Finland).
For primary bibliographic entry see Field 5C.
W79-00747

THE PRODUCTION BIOLOGY OF EURASIAN WATERMILFOIL (MYRIOPHYLLUM SPICATUM L.): A REVIEW,
Michigan State Univ., Hickory Corners. W.K. Kellogg Biological Station.
For primary bibliographic entry see Field 5C.
W79-00768

NUISANCE AQUATIC MACROPHYTE GROWTH,
Army Engineer District, Walla Walla, WA.
For primary bibliographic entry see Field 4A.
W79-00769

ENVIRONMENTAL EFFECTS OF MECHANICAL HARVESTING,
Ontario Ministry of the Environment, Rexdale. Water Resources Branch.
For primary bibliographic entry see Field 4A.
W79-00770

MACROPHYTE CONTROL BY HARVESTING AND HERBICIDES: IMPLICATIONS FOR PHOSPHORUS CYCLING IN LAKE WINGRA, WISCONSIN,
Wisconsin Univ.-Madison. Dept. of Botany.
S. R. Carpenter, and M. S. Adams.
Journal of Aquatic Plant Management, Vol. 16, p 20-23, June 1978. 4 fig, 24 ref. NSF DEB-7519777.

Descriptors: *Phosphorus, *Lake Wingra(WI), *Harvesting, *Aquatic weed control, *Eurasian water milfoil, *Eutrophication, *Herbicides, *Cycling nutrients, *Littoral, Mechanical control, Chemcontrol, Lakes, Madison(WI), Wisconsin, Macrophytes, Myriophyllum spicatum, Nutrient removal, Nutrients, Nutrient requirements, Limiting factors, Minerals, Urban runoff, Shallow water.

Harvesting Eurasian water milfoil (Myriophyllum spicatum) from shallow, eutrophic Lake Wingra, in Madison, Wisconsin, would remove an equivalent 37% annual net phosphorus load, 100% available phosphorus, and 22% total inorganic phosphorus in the upper 12 cm of littoral sediments. By contrast, herbicides would release at least 165 kg phosphorus into lake water within a few days, thereby increasing eutrophication. Such a nutrient pulse, equal to about 10% of the lake's annual net phosphorus load, would include considerable phosphate readily assimilable by algae. Lake Wingra, already eutrophic before settlement by Europeans in the area, receives a heavy nutrient loading from urban runoff, and though harvesting alone would not reverse the eutrophic process, harvesting plus reductions of point-source nutrient loads would significantly improve the lake's water quality. Annual harvesting would be necessary to deplete available phosphorus in the sediments because: (1) shoots obtain an unknown fraction of their phosphorus from the water. (2) available phosphorus in sediments is continually replenished by equilibration with insoluble forms, and (3) phosphorus is continually added to sediments by sedimentation. Harvesting would remove 15 kinds of minerals from the lake, including 10 essential plant nutrients. Maximum removal of phosphorus, the most critical process-limiting nutrient in the lake, would occur with a late August harvest. (Lynch-Wisconsin)
W79-00771

PRODUCTION AND UTILIZATION OF AQUATIC PLANT COMPOST,
Ontario Ministry of the Environment, Rexdale. Water Resources Branch.
I. Wile, J. Neil, G. Lumis, and J. Pos.
Journal of Aquatic Plant Management, Vol. 16, p 24-27, June 1978. 8 tab, 1 ref.

Descriptors: *By products, *Eurasian water milfoil, *Composts, *Aquatic plants, *Harvesting, *Fertilizers, Myriophyllum spicatum, Aquatic weed control, Mechanical control, Crop production, Flowers, Vegetable crops, Grasses, Trees, Fruit crops, Salt tolerance, Hydrogen ion concentration, Moisture content, Nutrients, Chemical analysis, Manure, Tobacco, Methodology.

Five composts utilizing harvested aquatic plants, primarily Eurasian water milfoil (Myriophyllum spicatum), were tested and found effective in

green house experiments with a variety of plants, vegetables, fruit, and turf grasses. Results demonstrated the value of composted aquatic plants as fertilizer ingredient, and indicate that with reduction of pH and salt levels, these composts would be equal or superior to existing commercial products. The composts, prepared in a high-rate aerobic composter, consisted of peanut shells to reduce moisture content and: (1) 78% air-dried aquatic plants, plus wet pondweed and poultry litter; (2) 83% unchopped aquatic plants and compost no. 1; (3) 80% chopped aquatic plants and compost no. 2; (4) 62% chopped aquatic plants, 21% tobacco paunch manure compost, and poultry litter; and (5) 68% chopped aquatic plants and 27% ground corn cobs. Chemical analyses of raw materials and composts are given in tables. Preliminary tests showed poultry litter produced extremely high salt levels (over .005 mhos). In experiments with top-watered Chrysanthemums, compost no. 4 produced plants and flowers superior to those grown in other composts or with peat moss; watering by capillary mat was unsatisfactory. Some composts stimulated growth of coleus, petunias, geraniums, creeping red fescue, marion kentucky bluegrass, perennial ryegrass, and germination of tomatoes and muskmelon, but not for white cedar due to high salt content. (Lynch-Wisconsin)
W79-00772

HYDRILLA SILAGE PRODUCTION, COMPOSITION AND ACCEPTABILITY,
Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
L. O. Bagnall, K. E. Dixon, and J. F. Hentges, Jr.
Journal of Aquatic Plant Management, Vol. 16, p 27-31, June 1978. 3 fig, 6 tab, 14 ref.

Descriptors: *Silage, *Hydrilla verticillata, *Cattle, *Feeds, *Aquatic plants, *By products, Aquatic weed control, Harvesting, Mechanical control, Pastures, Florida, Orange Lake(FL), Carbohydrates, Propionic acid, Citrus fruits, Moisture content, Hay, Equipment, Spoilage, Methodology.

Pressed Hydrilla verticillata made into silage with supplementary fermentable carbohydrate (dried citrus pulp, ground shelled corn, and propionic acid), was readily accepted by cattle. Steers consumed all of the hydrilla silage and coastal Bermudagrass hay offered them, but only 67% of hydrilla hay. Hydrilla harvested from Orange Lake, south of Gainesville, Florida, contained 7.5% dry matter initially and was screw-pressed to reduce moisture content. Fifteen kg was pressed in a 10-cm press for preliminary trials, 480 kg was pressed in a 20-cm press for preliminary animal acceptability trials, and 15,700 kg was chopped by forage harvester and pressed in a 30-cm press for animal acceptability and consumption trials. Pressed hydrilla was mixed with supplementary materials, packed into closed containers, and stored in 450-ml wide-mouthed polyethylene bottles, 208-liter drums, or 1.2 x 2.4-m culvert silos. Bottle samples were stored 300 days, barrel silages 113 days, and culvert silages 133 days. In general temperature rise caused by biological activity in the silage was small and brief. All pH levels were higher than the 3.5-4.0 common for high-quality silage of common terrestrial crops, normally an indication of low silage quality. Bottled hydrilla without dried citrus pulp became putrid, spoilage in barrels was 22-100%, and spoilage in culvert silos ranged from 17-25%. Odor of usable silage was typical of good silage. (Lynch-Wisconsin)
W79-00773

EFFECT OF WATER LEVEL FLUCTUATION AND HERBICIDE ON EURASIAN WATERMILFOIL IN MELTON HILL RESERVOIR,
Tennessee Valley Authority, Muscle Shoals, AL. Div. of Environmental Planning.
For primary bibliographic entry see Field 5C.
W79-00775

CHEMICAL CONTROL OF HYDRILLA,
Corps of Engineers, Washington, DC.
E. O. Gangstad.
Journal of Aquatic Plant Management, Vol. 16, p 38-40, June 1978. 4 tab, 9 ref.

Descriptors: *Chemcontrol, *Hydrilla verticillata, *Aquatic weed control, *Herbicides, *Diquat, *Copper, *Toxicity, *Reservoirs, Water pollution effects, Copper sulfate, Cutrine, Copper sulfate pentahydrate, Pesticide residues, Alkalinity, Ammonia, Nitrates, Dissolved oxygen, Fish, Florida, Inglis Reservoir(FL).

Growth pool simulations and large-scale field tests showed good control of Hydrilla verticillata by combinations of diquat and copper, with no toxic effects on fish. Residues of diquat and copper in the water were negligible 14 days after treatment, but there was a statistically significant increase in ammonia-nitrogen and a slow decline in nitrate-nitrogen. Little effect was detected on dissolved oxygen in surface waters. In the initial simulations diquat, diquat plus copper sulfate pentahydrate (CSP), copper sulfate, and encapsulated copper sulfate were applied to hydrilla in 3.4-m diameter plastic pools, and effects were monitored for eight weeks. Pools contained bluegills, largemouth bass, and channel catfish. No fish mortality resulted. Diquat plus CSP provided greatest effectiveness against hydrilla (100% after four weeks), followed by diquat alone (80-93% after eight weeks). Field tests were performed at two sites in Inglis Reservoir, western Florida, using diquat plus Cutrine (triethanolamine copper complex) and diquat plus CSP to hydrilla beds. Plant density estimates were made before treatment and 3-128 days after treatment. Diquat plus CSP was again the most effective, achieving 93% control after 82 days, declining to 74% after 128 days. Diquat plus Cutrine was 76% effective after 82 days, decreasing to 44% after 128 days. Satisfactory control persisted with both treatments for about nine months. (Lynch-Wisconsin)
W79-00776

TOXICITY OF SULFURIC ACID TO AQUATIC PLANTS AND ORGANISMS,
Florida State Game and Fresh Water Fish Commission, Eustis. Eustis Fisheries Research Lab.
For primary bibliographic entry see Field 5C.
W79-00777

AN APPROACH TO ESTIMATING THE STANDING CROP OF WATERHYACINTH,
Commonwealth Scientific and Industrial Research Organization, Brisbane (Australia). Long Pocket Labs.
I. W. Forno, and A. S. Bourne.
Journal of Aquatic Plant Management, Vol. 16, p 50-52, June 1978. 1 fig, 1 tab, 3 ref.

Descriptors: *Water hyacinth, *Standing crops, *Estimating, *Biocontrol, *Aquatic weed control, *Methodology, Equations, Eichhornia crassipes, Aquatic plants, Drying, Lagoons, Australia, Leaves, Petioles, Queensland(Australia).

A method for estimating the standing crop of water hyacinth (Eichhornia crassipes) categorizes plants as 'peaked' and 'nonpeaked' groups according to the distribution of leaves over classes defined by petiole length. Equations are presented for each group, which provide estimates accurate to within 10% of values obtained by weighing dried samples. Plants in three lagoons in southeastern Queensland, Australia, were used in developing the method. Leaves from each plant sampled were divided into five classes according to petiole length: 0-10 cm, 10-20 cm, 20-40 cm, 40-60 cm, and 60 cm. Leaves in each class were counted, dried to constant weight at 70C, and weighed, and mean dry wt/leaf determined for each class. It was apparent that a relationship existed between mean leaf weight and petiole length, but a substantial variation in mean leaf weights of different samples required modification of the simple equation for standing crop. Data indicated proportional allocation of leaves to each class was significant; this was due to conditions of peaked growth at the end of summer, compared with nonpeaked growth early in winter then cold weather stimulates production of shorter leaves with more bulbous petioles. Separation into the two groups is accomplished by means of a ratio of actual leaf weight to estimated leaf weight. The equation for the peaked group is 0.339 C1 + 0.685 C2 + 1.002 C3 + 1.848 C4 + 3.077 C5, and for the nonpeaked group 0.218 C1 + 0.409 C2 + 0.730 C3 + 1.313 C4 + 2.485 C5, where C1, C2, C3, etc. denote number of leaves in each class. (Lynch-Wisconsin)
W79-00779

A REVIEW OF CURRENT INTEREST AND RESEARCH IN WATER HYACINTH-BASED WASTEWATER TREATMENT,
Battelle Columbus Lab., OH.
R. K. Markarian, J. E. Balon, and A. C. Robinson.
Available from the National Technical Information Service, Springfield, VA 22161 as N77-33683, Price codes: A04 in paper copy, A01 in microfiche. Report BCL-OA-TFR-77-1, February 1977. 53 p, 9 fig, 10 tab, 33 ref, 2 append. NASA NASW-2800, Task Number 16.

Descriptors: *Water hyacinth, *Waste water treatment, *Reviews, *Treatment facilities, *Tertiary treatment, Nutrient removal, Eichhornia crassipes, Beneficial use, Aquatic plants, Sewage treatment, Industrial wastes, Municipal wastes, Research priorities, Institutional constraints, Regulation, Water quality standards, Effluent limitations.

A survey of researchers, literature, and potential users indicates that water hyacinth (Eichhornia crassipes) for wastewater treatment can provide a lower-cost method for small cities and towns to meet increasingly stringent effluent requirements. While there have been a few demonstrations of hyacinth systems during the past two years, little design data has been made available. Several full-scale projects are planned for 1977-78. At present there is no surce from which to purchase a treatment system or design which has been approved by appropriate regulatory agencies or for which there are demonstrated performance capabilities or cost information. Such a product may be available in three or four years, however, as several suppliers of conventional systems are testing hyacinth designs. Controlled experiments under realistic nutrient loading conditions are needed to develop a satisfactory system. Required data include: (1) optimal physical design (lagoon depth, area, holding time, and harvesting methodology); (2) construction and operating costs; (3) plant-escape prevention techniques; and (4) system performance under various loading conditions and temperature cycles. The best institutional arrangement for such testing would involve a joint effort of an engineering firm, wastewater treatment authority, regulatory agencies and a funding source such as EPA. The use, if any, of harvested plants is not of general concern. (Lynch-Wisconsin)
W79-00786

THE DISTRIBUTION OF AQUATIC WEEDS IN THE FINGER LAKES OF NEW YORK STATE AND RECOMMENDATIONS FOR THEIR CONTROL,
Eisenhower Coll., Seneca Falls, NY. Dept. of Biology.
L. Baston, Jr., and B. Ross.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-268 436, Price codes: A07 in paper copy, A01 in microfiche. Report for New York State Assembly Scientific Staff, Albany, June 1975. 123 p, 36 fig, 10 tab, 55 ref.

Descriptors: *Finger Lakes(NY), *Aquatic weed control, *Distribution, *Cayuga Lake(NY), *Eutrophication, *Eurasian water milfoil, New York, Lakes, Otisco Lake(NY), Skaneateles Lake(NY), Owasco Lake(NY), Seneca Lake(NY), Keuka Lake(NY), Canadaigua Lake(NY), Conesus Lake(NY), Biocontrol, Chemcontrol, Mechanical control, Macrophytes, Species composition, Species diversity, Density, Myriophyllum spicatum, Nutrients, Sedimentation, Littoral.

Eurasian water milfoil (Myriophyllum spicatum) surveyed in Cayuga Lake in summer-fall 1974 was the worst weed problem in eight of New York State's finger lakes. Seneca Lake is not as severely infested, but has significant milfoil population at its north end. Skaneateles, Otisco, Owasco, Keuka, Canadaigua, and Conesus Lakes have small, isolated weed problems, but are generally in excellent condition. The most troublesome plants in the Finger Lakes are: Eurasian water milfoil, northern water milfoil (Myriophyllum exalbescens), coontail (Ceratophyllum demersum), water star grass (Heteranthera dubia), Vallisneria americana, and pondweed (Potamogeton spp.). The flora and effects of eutrophication are distinct for each lake, though excessive weed growth is primarily caused by a combination of nutrient availability and heavy sedimentation in shallow areas. Recommended short-term control measures include harvesting of plants in conjunction with carefully controlled herbicide applications. Harvesting also provides long-term benefits through nutrient removal, as does dredging. The most important long-term goal is control of urban sprawl through land-use restrictions. (Lynch-Wisconsin)
W79-00787

ANALYSIS OF ECONOMIC EFFECTS OF ENVIRONMENTAL REGULATIONS ON THE INTEGRATED IRON AND STEEL INDUSTRY. VOLUME I.
Temple, Barker and Sloane, Inc., Wellesley Hills, MA.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 213, Price codes: A18 in paper copy, A01 in microfiche. Publication No. EPA 230/3-77-015A, July 1977. 416 p. 35 fig, 3 tab, 7 append. 68-01-2832.

Descriptors: *Analytical techniques, *Iron and steel industry, *Economic impact, *Costs, *Pollution abatement, *Water pollution control, *Regulation, Water quality standards, Effluent limitations, Emission standards, Planning, Iron, Steel, Air pollution, Model studies, Computer models, Capital costs, Operating costs, Industrial production, Industrial wastes, Economics, Financing, Operation and maintenance, Effluents.

Analysis of the economic impact of environmental regulatons on the integrated iron and steel industry by means of a computer model shows that capital expenditures of $6.8 billion will be required for pollution control between 1975-83, of which $3.6 billion will be allocated to water pollution and $3.2 billion to air pollution control. Annual operating costs are likely to increase less than 2% during the next decade, and costs to steel consumers should increase less than 5%. Capital availability, and impacts on energy, employment, the community, and balance of trade are evaluated. This study is unique in combining a cost impact methodology with a computer-based revenue requirement and external financing methodology which permits integrated analysis of the economic impact of environmental regulations. A policy testing model, PTm (Steel), combines planning assumptions of industry and technical experts with structural relationships utilized by engineers and accountants. The analysis covers processes from raw materials storage yards for coke ovens and blast furnaces through finishing mills, but excludes production and transportation of raw materials and fabrication of steel products. An estimated 70% of net fixed assets of major integrated steel companies during the 1972-74 are represented. Environmental requirements are those promulgated, proposed, or anticipated by EPA only. Research methodology is described in detail in Volume II. (Lynch-Wisconsin)
W79-00788

ECONOMIC IMPACT OF A PROPOSED CHANGE IN THE AMMONIA EFFLUENT STANDARDS, R77-6,
Illinois Inst. for Environmental Quality, Chicago.
L. Huff.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 992, Price codes: A05 in paper copy, A01 in microfiche. IIEQ Document No. 77/18, June 1977. 88 p, 7 fig, 27 tab, 14 ref, 3 append. 80.094.

Descriptors: *Regulation, *Water quality standards, *Illinois, *Effluent limitations, *Economic impact, *Cost-benefit analysis, Ammonia, Economics, Effluents, Limiting factors, Streams, Rivers, Water pollution control, Treatment facilities, Waste disposal, Waste water treatment, Water quality control, Environmental Protection Agency, Municipal wastes, Industrial wastes.

The Illinois Environmental Protection Agency (IEPA) has petitioned the Pollution Control Board to consider its proposed regulation R77-6 ('ammonia effluent standards date revision') which relaxes enforcement of Rule 402 of the Water Pollution Regulations regulating ammonia effluents into Illinois Rivers. This report, which evaluates the economic impact, costs, and benefits of both enforcing and relaxing the rule, recommends that the proposal is justified, and that public economic impact hearings be held. The exceptions would temporarily release small operations from expensive and complex treatment requirements and provide additional time for larger dischargers to gain compliance. The following amendments are proposed: (1) any source in existence as of 1 April 1977 with an untreated ammonia load less than 60 pounds/day will be exempt from providing specific ammonia nitrogen control; (2) other dischargers would not be required to achieve an effluent quality better than 4.0 mg/liter ammonia nitrogen (November-March) when Rule 203 is being violated by 31 December 1978; and (3) these exemptions would terminate on 1 July 1981. IEPA believes that it would be a technological and economic hardship for municipal waste treatment plants to be required consistently to maintain an effluent as low as 1.5 mg/liter ammonia; these amendments are designed to alleviate the compliance problem of several hundred such municipalities who might otherwise lose state or federal funding, and also assists small private dischargers who cannot afford compliance. (Lynch-Wisconsin)
W79-00789

THE UNITED KINGDOM MARKET FOR AIR AND WATER PURIFICATION AND POLLUTION CONTROL EQUIPMENT,
Planning Research and Systems, Ltd., London (England).
Available from the National Technical Information Service, Springfield, VA 22161 as DIB-77-10-515, Price codes: A02 in paper copy, A01 in microfiche. Report DIB-77-10-515, May 1977. U.S. Department of Commerce, Domestic and International Business Administration. 84 p. 16 tab, 5 append.

Descriptors: *Forecasting, *Pollution abatement, *Equipment, Demand, *United Kingdom, *Marketing, United States, Economics, International trade, Export, Import, Air pollution, Monitoring, Water pollution control, Solid wastes, Water purification, Sewage treatment, Effluents, Instrumentation.

The market for pollution control equipmet in the United Kingdom, which remained static 1974-76k, is expctd to grow 2-3% per year 1977-78. Projections for 1976-80 indicate the market for water purification equipment will grow 2% annually, and air treatment equipment by 5%. Due to slow recorvery of the British economy, expenditures for water and effluent treatment equipment have declined 1974-76; spending by local water authorities has decreased as much as 20% as aresult of government cutbacks. Of the 1976 market, valued at $327.7 million, 48% ($157.3 million) was spent on water purification and sewage effluent treatment, 26% ($83.9 million) on particulate ad gaseous air pollution control equipment, 21% ($69.2 million) on solid waste disposal, and 6% ($17.3 million) on ar and water monitoring. U.S. equipment accounted for a sizeable share (26-28%) of the British improt market for pollution control equipment 1974-78, particularly in monitoring and air pollution control, with the strongest competition from Germany and Sweden. The U.S. share of the total U.K. pollution control market is likely to be slightly less than 20% by 1980. The British government is the largest end user, consuming about 38%. A list of U.S. products with the highest sales potential is provided. (Lynch-Wisconsin)
W79-00790

ECONOMIC IMPACT OF PROPOSED THERMAL DISCHARGE STANDARD FOR LAKE SANGCHRIS,
Oberlin Coll., OH.
R. M. Wolff, E. L. Hardin, Jr., and M. Friedman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 981, Price codes: A05 in paper copy, A01 in microfiche. IIEQ Document No. 76/25, Dec. 1976. 66 p, 4 fig, 16 tab, 11 ref. 5 app.

Descriptors: *Economic impact, *Lake Sangchris(IL), *Thermal pollution, *Electric powerplants, *Environmental effects, *Effluent limitations, Illinois, Kincaid Station Electric Generating Plant(IL), Artificial lakes, Impoundments, Regulation, Cooling water, Heated water, Costs, Alternative costs, Water pollution control, Water quality standards, Cost-benefit analysis, Cooling towers, Rates, Electric power costs.

This report evaluates a thermal discharge standard(Illinois Water Pollution Regulations) proposed by Commonwealth Edison for its Kincaid Station steam electric generating plant, which discharges heated effluent into Lake Sangchris, an impoundment of three branches of Clear Creek, Christian County, Illinois. The proposed standard (Regulation R76-11) specifies that discharge to Lake Sangchris: (1) shall not exceed 99 F during more than 7% of the hours in a 12-month period, ad (2) shall at no time exceed 111 F. It isconcleded that both economic and environmental considerations favor the proposed standard, although there is considerable doubt about enironmental effects of temperatures above 107 F, the highest so far recorded, and the probable frequency of such temperature excursions. The proposal is submitted in accordance with Regulation R75-2 which allows exemption of man-made cooling lakes from the general thermal discharge standard prohibiting a rise of more than F above ambient water temperature, not to exceed 90 F April-November and 60 F the rest of the year. At 107 F there is no apparent environmental damage. Power consumers would not be directly affected by forcing the plant to reduce its load, but replacement generating capacity would involve a 4.6-fold cost increase. Limiting maximum temperature to 99 F would probably result in plant operation at reduced thermal efficiency. Off-stream colling requires additional energy, and cooling towers are not economically feasible. (Lynch-Wisconsin)
W79-00792

NON-AGRICULTURAL LAND USE AND DESERTIFICATION,
Department of Environment, Housing and Community Development, Canberra(Australia).
For primary bibliographic entry see Field 4A.
W79-00806

OCEAN DESERTS AND OCEAN OASES,
Jaycor, Alexandria, VA.
J. D. Thompson.
Climatic Change, Vol. 1, p 205-230, 1978. 2 fig, 2 tab, 86 ref.

Descriptors: *Oceanography, *Marine biology, *Fish conservation, *Aquatic environment, Biological communities, Water pollution sources, Variability, Ocean currents, Coasts, Upwelling, Fish management, Fish farming, Fish populations, Aquiculture, Fishing.

Desertification is frequently discussed and studied in terms of losses of biological productivity on land. Not as well known or studied, however, is the serious problem of desertification in our seas. While the land may suffer from overgrazing, the seas frequently experience overfishing; as the land can experience weather changes affecting agricultural productivity, the seas experience changes in currents and thermal structure producing dislocation of fisheries; and as land can be used for variable purposes, the sea is frequently used as a dumping pit for mining and other uses incompatible with the maintenance of its natural ecosystem. Additionally, although various pollutant cause considerable destruction on land, the sea is often the ultimate sink for most of them. Surprising to most people is the fact that 90% of the world's ocean area is desert in a biological sense. Documented and discussed in this article is the thesis that the sea is susceptible to severe losses of biological productivity due to natural and anthropogenic factors. While most of the sea is biologically a desert, the areas of high productivity are concentrated in the coastal zones closest to man's pollution. Coastal upwelling zones account for one-half of the world's fish harvest but comprise only .1% of the ocean surface and have been heavily over exploited. Natural variability of the ocean's climate, overfishing, and pollution emerge from this analysis as the principal factors causing the serious desertification of our oceans. (Tickes-Arizona)
W79-00817

TREATMENT CONTROL APPARATUS FOR WATER SYSTEMS,
For primary bibliographic entry see Field 5F.
W79-00820

SEQUESTERING OF CA++ AND MG++ IN AQUEOUS MEDIA USING ZEOLITE MIXTURES,
Union Carbide Corp., New York. (Assignee).
For primary bibliographic entry see Field 5F.
W79-00851

AN EXPERIMENTAL STUDY OF FLOW AND OXYGEN TRANSFER IN CIRCULATION INDUCED BY AIR BUBBLE PLUMES,
New Hampshire Univ., Durham. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 2E.
W79-00856

WILDERNESS WATER QUALITY: BISHOP CREEK BASELINE STUDY, 1974,
California Univ., Los Angeles. Environmental Science and Engineering.
R. K. Kawaratani, and R. L. Perrine.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 353, Price codes: A11 in paper copy, A01 in microfiche. California Water Resources Center, Contribution No. 150, June, 1975. 231 p, 90 fig, append. (California Water Resources Center Project UCAL-WRC-W-489).

Descriptors: *Baseline studies, *Monitoring, Water quality control, *Water quality standards, California, *Bishop Creek(Calif), Pollutant identification.

The overall objective of this study program is to develop water quality test methods, either adaptations of established, standard methods or entirely new methods which might be needed, for continuing water quality monitoring and protection in prime, remote recreation-watershed areas. Both chemical and bacteriological contaminants or stream contents are to be studied. The need to detect or to anticipate possible short-term increases in contaminants is emphasized. The relationship of water quality variations to local use and local geological and hydrological features also must be noted. All work has been conducted with the cooperation and guidance of appropriate state and federal agencies. The objective of the specific program of research, which is the subject of this report has been to establish a firm baseline for the continuing effort. Thus the current work is comprehensive, and is also detailed considering the anticipated scope of the entire study.
W79-00859

ENVIRONMENTAL DATA MANAGEMENT: THE IDENTIFICATION OF OUTLIERS,
Kentucky Univ., Lexington. Dept. of Economics.
J. R. Marsden, D. E. Pingry, and A. B. Whinston.
Journal of Environmental Economics and Management, Vol. 3, p 154-163, 1976, 1 fig, 2 tab, 10 ref. OWRT-A-031-IND(4).

Descriptors: *Data processing, *Data Storage and Retrieval, Basic data collections, Water quality standards, Federal Water Pollution Control Act, *Data outliers, Data verification, Data reliability, Data management system.

Increased emphasis on pollution control and abatement has often necessitated development of large scale data bases. While sophisticated techniques have been developed and employed for data storage and manipulation, parallel developments in analyzing the accuracy and reliability of the data have been absent (see, for instance, the broad spectrum of requirements outlined in the Federal Water Pollution Control Act Amendments of 1972). This paper centers on the latter and sets out a procedure for data editing and 'outlier' indentification based on an application of discriminant analysis. A hypothetical example is included along with some suggested applications.
W79-00863

OPTIMAL CONTROL OF COOLING WATER DISCHARGE FROM A POWER PLANT,
Kansas State Univ., Manhattan. Inst. for Systems Design and Optimization.
J. T. Tseng, L. T. Fan, and C. L. Hwang.
IEEE Transactions of Systems, Man, and Cybernetics, Vol. SMC-4, No. 6, p 523-531, November 1974. 4 fig, 1 tab, 33 ref. OWRT B-030-KAN(8), 14-31-0001-3592.

Descriptors: Water quality control, Thermal pollution, *Cooling water discharge, Optimal control, Powerplants, Maximum principle, Direct search.

The optimal cooling water discharge policy from a power plant to a stream has been studied for the purpose of preventing thermal pollution. The control policy has been obtained by means of the maximum principle and also by means of a direct search technique. The optimal policy permits a power plant to operate at the highest possible capacity and at the same time to maintain a high water quality. The policy depends on the relative weight between water quality represented by the dissolved oxygen (DO) distribution and power generation represented by the cooling water discharge rate. The transient temperature, DO, and biological oxygen demand (BOD) profiles corresponding to the optimal policy have also been determined.
W79-00870

USER'S MANUAL FOR PREMINING PLANNING OF EASTERN SURFACE COAL MINING, VOLUME I: EXECUTIVE SUMMARY,
Pennsylvania State Univ., University Park. Dept. of Mineral Engineering.
R. V. Ramani, and M. L. Clar.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-287 086, Price codes: A05 in paper copy, A01 in microfiche. Report No EPA-600/7-78-180, August 1978. Vol I of VI, 81 p, 6 fig, 4 tab, 5 append. EPA R803882.

Descriptors: *Premining planning, *Coal mines, *Mining, *Mine engineering, *Water management(Applied), *Reclamation, *Environmental effects, Hydrology, Geology, Mine drainage, Land use, Land reclamation, Planning, Comprehensive planning, Data collections, Regulation, Law enforcement, Legislation, Permits.

A study on surface mining of coal in the Eastern U.S. was initiated for the purpose of establishing guidelines for developing, evaluating, and selecting the least environmentally detrimental mining and reclamation practices. Scope was limited to three major areas: surface mine engineering, including geological and hydrological settings as essential to premining planning; water management; and land-use planning. This volume, the first of six, provides a summary of the major areas to be covered in the project, with outlines of the other five which are devoted to surface mine engineering, geology of Eastern coalfields, mine hydrology, mine drainage management and monitoring, and mine land planning. Appendices provide a survey of state and Federal strip mine regulations in the Eastern and Midwestern coal producing states, a list of state surface mine reclamation control laws and responsible agencies, a list of EPA manuals related to environmental control for surface coal mining, and a list of major functions of the Office of Surface Mining Regulation and Enforcement. Also included are examples of typical data required from companies applying for a mining permit. (Majtenyi-IPA)
W79-00877

DOMES UPPER WATER PHYSICAL OCEANOGRAPHY, A COMPONENT OF THE DOMES PROGRAM,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W79-00885

DISTRIBUTION AND COMPOSITION OF THE SUSPENDED PARTICULATE MATTER IN THE WATERS OF THE DOMES REGION,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W79-00886

TRACE METAL BASELINES IN THE DOMES STUDY AREA,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5B.
W79-00887

STUDIES ON THE EFFECTIVENESS OF THE GUPPY POECILIA RETICULATA IN CONTROLLING CULEX PIPIENS S.L.: II. EFFICIENCY OF PREDATION IN BREEDING HABITATS, (IN JAPANESE),
Dep. Parasitol, Sch. Med., Teikyo Univ., Kaga, Itabashi, Tokyo, Jap.
T. Kurihara, and M. Sasa.
Jap J Sanit Zool. 24(1), p 79-82, 1973.

Descriptors: Age, Breeding, *Culex-pipiens, Culex-pipiens-pallens, Guppy, Habitats, Japan,

*Poecilia-reticulata, Predation, Water pollution control.

Experiments were carried out with 2 guppies in tanks placed outdoors under natural summer condition of Tokyo (Japan); water temperature was around 25-27C Five egg rafts of C. pipiens pallens were given each morning for 7 days. Each egg raft contained an average of 249 eggs. The number eaten was estimated at 3 rafts/day. Some of the larvae had hatched from the eggs, but it was difficult to estimate the number which did because of their small size. No larvae were found on the 8th morning. To determine the number of larvae of different developmental stages which was eaten per day, various stage of larvae were introduced in each tank. When 2000 larvae, which had recently hatched from eggs were supplied, 369 of them had pupated after 6-10 days. In the control tank, where there were no guppies, 1614 larvae survived and pupated. It was estimated that 386 of the original 2000 larvae in the control tank died naturally. If it is assumed that an approximately equal number of larvae will die naturally in the experimental tank, then the actual number of larvae consumed was estimated at 1245, or (2000-369)-(2000-1614), during the larval period. When 50 larvae of age 3 days after hatching were supplied in the same way as mentioned above, the number of larvae eaten was estimated at 249 larvae by the end of the pupation period; under similar conditions, 142 four-day larvae were consumed; 50 five-day larvae; and 35 six-day were eaten. From the above, the number of larvae eaten per day was calculated in the case of 0-2 days old larvae as: (1245-249)/3=332 larvae. In the same way, 107 three-day old larvae, 92 four-day and 15 five-day old larvae were eaten per day. When a mixed-age population of larvae were supplied, the number eaten was greater in younger-aged larvae than older ones. Some older ones were always eaten in spite of the presence of young larvae still remaining in the tank, although the number of older larvae consumed was less in comparison when a homogeneous age-group ralulation was available. (See also W75-04382)--Copyright 1974, Biological Abstracts, Inc.
W79-00889

STUDIES ON EFFECTIVENESS OF GUPPY PEOCILIA RETICULATA IN CONTROLLING CULEX PIPIENS S.L.: III. FIELD EVALUATION OF CONTROL METHODS USING GUPPY LARVICIDE, OR GUPPY-LARVICIDE, (IN JAPANESE),
Dep. Parasitol., Sch. Med., Teikyo Univ., Kaga, Itabashi, Tokyo, Jap.
T. Kurihara, K. Hata, and M. Sasa.
Jap J Sanit Zool. 24(1), p 83-88, 1973.

Descriptors: *Culex-pipiens, Culex-pipiens-pallens, Fenitrothion, Guppy, *Larvicides, Methods, Oviposition, *Poecilia-reticulata, Rafts, Water pollution control.

Four tanks, labeled A, B, C, and D, containing 750 l of water, were placed outdoors near the laboratory. Breeding of C. p. pallens was found in each tank in early June, 1972. Twenty guppies, or 10 mature pairs, were introduced in 2 of the tanks, B and C, on 9 June 1972. Tank B was then treated with fenitrothion 1 ppm, tank C remained untreated. Tank D was treated with fenitrothion 1 ppm on the same day, and tank A, the control tank, received neither guppies nor fenitrothion. The observation for each tank was conducted using a ladle to count the larval and pupal densities every 2 or 3 days. Also counts of total number of egg rafts on the water surface were made on the same day. These observations were made until the end of Sept. Larvae and pupae dramatically disappeared on the 4th day after fenitrothion treatment in both tanks B and D. In the case of tank D, the chemical treatment had to be repeated 5 times during a 2-mo. period due to the outbreak of larvae every 10 or 20 days. Tank B, however, received no additional chemical treatment after the initial treatment because of the presences of the guppies. A number of pupae was observed for 3 wk after introduction of guppies to tank C, but all pupae had disappeared by the end of this period. More than 100 rafts a day of oviposition were observed in tanks A and D. However, no rafts were recognized from tanks B and C, except for very few days during the peak time of oviposition activity of mid-summer. As Part II of the present report series showed, these egg rafts were eaten by guppies in each tank. Thus, in tanks B and C no adult mosquitoes emerged throughout the summer season. (See also W75-04382)--Copyright 1974, Biological Abstracts, Inc.
W79-00890

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF: PROGRAM WORK STATEMENTS FISCAL YEAR 1978, VOLUME II.
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
For primary bibliographic entry see Field 6G.
W79-00896

THE EFFECTS OF TEMPERATURE ON THE GROWTH AND SURVIVAL OF LARVAL AND JUVENILE CRAYFISH, PACIFASTACUS LENIUSCULUS,
California Univ., Davis. Dept. of Animal Science.
For primary bibliographic entry see Field 5C.
W79-00909

PRINCIPLES OF WATER RESOURCES PLANNING (PHASE II),
Rutgers - The State Univ., New Brunswick, NJ. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W79-00913

THE EFFECTS OF IRRIGATION RETURN WATER ON AQUATIC PLANTS (PERIPHYTON) IN THE SACRAMENTO RIVER AT KNIGHTS LANDING, CALIFORNIA,
California Univ., Davis. Dept. of Land, Air and Water Resources.
For primary bibliographic entry see Field 5C.
W79-00914

MISSISSIPPI WETLANDS PROTECTION PRACTICE AND PROCEDURE.
Mississippi Univ. Law Center, University.
For primary bibliographic entry see Field 6E.
W79-00927

OIL POLLUTION CONTROL MECHANISMS - STATUTES AND REGULATIONS.
Mississippi Univ. Law Center, University.
Mississippi/Alabama Sea Grant Consortium Report No. MASGP-78-014, April 1978. 73 p, 2 append. SG-04-7-158-44017.

Descriptors: *Oil pollution, *Legislation, *Oil spills, Water pollution control, Pollution abatement, Pollution prevention.

The purpose of this analysis is to provide a detailed picture of federal statutes and regulations, as well as case law, bearing on oil spill prevention and control. Emphasis has been placed on federal action occurring after a spill, although some effort is directed toward review of prevention statutes and regulations. In-depth consideration is given the control of oil pollution under the Federal Water Pollution Control Act but this analysis also touches lightly upon acts that have a lesser effect on oil pollution control. These acts being: The Refuse Act, the Ports and Waterways Safety Act of 1972, the Outer Continental Shelf Lands Act, the Oil Pollution Act of 1961, the Deepwater Port Act of 1974, and the Fish and Wildlife Coordination Act. (NOAA)
W79-00928

CRISIS SCIENCE: INVESTIGATIONS IN RESPONSE TO THE ARGO MERCHANT OIL SPILL,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 5C.
W79-00929

EVALUATION OF AN AIR BUBBLER TO MITIGATE FISH IMPINGEMENT AT AN ELECTRIC GENERATING PLANT,
Texas Instruments Inc., Buchanan, NY.
J. T. Lieberman, and P. H. Muessig.
Estuaries, Vol. 1, No. 2, p 129-132, 1978. 4 tab, 15 ref.

Descriptors: *Entrainment, *Thermal powerplants, *Fish behavior, Cooling water, Animal behavior, Water chemistry, Water analysis, On-site data collections, Intakes, Outlets, Fish barriers, Pumps, Striped bass, White seaperch, Statistical methods, *Impingement, Air bubbler.

To determine whether fish impingement at an electric generating plant was significantly reduced during the operation of an air bubbler, impingement monitoring data was subjected to statistical analysis. Daily impingement rates were calculated for total fish collections and for three impinged species, and associated with water chemistry conditions and air curtain operation during impingement periods. Analysis for each species by season indicated that the air curtain was not an effective fish deterrent.
W79-00950

TAMANO OIL SPILL IN CASCO BAY: ENVIRONMENTAL EFFECTS AND CLEANUP OPERATIONS.
Environmental Protection Agency. Washington, DC. Spill Prevention and Control Board.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 950, Price codes: A11 in paper copy, A01 in microfiche.
Environmental Protection Agency, EPA-430/9-75-018, 284 p, December 1975. 53 fig, 12 tab, 2 app, 13 ref.

Descriptors: *Oil, *Oil spills, *Oil pollution, Organic compounds, Path of pollutants, Water pollution effects, Biological communities, Bottom sediments, Littoral, Beaches, Benthic flora, Benthic fauna, Gulls, Water birds, Chemical analysis, Chromatography, Clams, Lobsters, Environmental effects, Maine, *Tissue analysis, Casco Bay, Maine.

This study was undertaken to determine the effects of no. 6 oil on marine communities of Casco Bay, Maine and to assess the effectiveness of containment and cleanup operations. Areas studied included rocky intertidal, intertidal mud, and subtidal benthic. Comparable control stations were chosen at Bailey Island and Orrs Island. Stations were analyzed for density and diversity of species as an indicator of stress. Sediments and selected biota were analyzed for No. 6 oil by gas chromatography. Results showed contamination at all stations, even those chosen as controls, indicating that the ultimate disposition of the oil did not correspond to sightings of surface slicks immediately following the spill. (EIS-Deal)
W79-00983

ELEOCHARIS ACICULARIS (L) R AND S: THE AUTECOLOGY OF AN ACID TOLERANT SEDGE,
Pennsylvania State Univ., University Park. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W79-00984

WASTEWATER MANAGEMENT ALTERNATIVES FOR THE SHELLFISH PROCESSING INDUSTRY,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
F. G. Pohland, and J. W. Hudson.
Georgia Marine Science Center, Sea Grant Program Technical Report Series No. 78-2, April 1978. 133 p, 45 fig, 20 tab, 44 ref, append.

Descriptors: *Georgia, *Waste water treatment, Food processing industry, *Shellfish processing industry, Management, Alternative planning, Water pollution control.

Laboratory studies were conducted at the Sanitary Engineering Laboratories of the Georgia Institute of Technology to establish the technical applicability of various wastewater tratment methods for shellfish processing waste discharges. The relative economies associated with the implementation of various selected wastewater management alternatives were also estimated and compared. Physical-chemical treatability applications included chemically aided coagulation-flocculation, activated carbon adsorption, ion exchange and sand filtration. biological modes for wastewater stabilization consisted of aerobic slurry (activated sludge-type) treatment, single-stage and recycle contact anaerobic treatment, rotating biological contactors, and anaerobic packed bed columns. (NOAA)
W79-00995

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

OPTIMIZATION OF REAL-TIME HOURLY OPERATIONS OF A COMPLEX, MULTIPLE PURPOSE RESERVOIR SYSTEM,
California Univ., Los Angeles. School of Engineering and Applied Science.
W. W-G. Yeh, L. Becker, and W-S. Chu.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 356, Price codes: A10 in paper copy, A01 in microfiche. Report No. UCLA-ENG-7807, February 1978. 194 p, 13 fig, 12 tab, 79 ref, append. OWRT C-7099(No. 6209)(1), 14-34-0001-6209.

Descriptors: *Optimization, *Multiple purpose reservoirs, *Computer models, *Computer programs, *Reservoir operation, *Hydroelectric power, *Reservoir releases, Reservoir management, Water management(Applied), Model studies, Flow control, Simulation, Dynamic programming, Linear programming, Scheduling, Water utilization, Optimum development plans, Management.

The development of an hourly optimization model for on-line use in operating the Central Valley Project (CVP) in California is described. The procedures used for optimization of CVP, a complex multiple purpose reservoir system, are applicable to other water resource systems with appropriate changes in program details. The hourly program maximizes a weighted summation of generated power over a 24-hour period subject to specified plant releases obtained from a daily program, a desired hourly power schedule, and appropriate system and equipment restraints. The first phase of development involved determination of a good feasible policy (a set of releases) through an iterated linear programming and adjust process. The second phase of development used this feasible policy as a starting policy in an incremental dynamic programming, successive approximations process to derive an optimal policy. CVP operational records of some typical days were compared with program outputs for these days and significant improvements were observed, both better conformance with the power schedule desired by the Pacific Gas and Electric Co., and more efficient hydropower production. (Majtenyi-IPA)
W79-00501

STATISTICAL AND STOCHASTIC ANALYSES OF SYNTHETICALLY GENERATED URBAN STORM DRAINAGE QUANTITY AND QUALITY DATA,
Purdue Univ., Lafayette, IN. Water Resources Research Center.
G. Padmanabhan, and J. W. Delleur.
Available from National Technical Information Service, Springfield, VA 22161 as PB-288 355, Price codes: A06 in paper copy, A01 in microfiche. Technical Report No. 108, July 1978. 111 p, 40 fig, 26 tab, 46 ref. OWRT C-6106(No. 5213)(4).

Descriptors: *Urban drainage, *Drainage systems, *Planning, *Water quality, Storm water, Storm drains, Management, Simulation analyses, Data collections, *STORM, *ILLUDAS.

This report deals with an analysis of the synthetic data generated by the urban runoff model 'STORM' using 21 years of hourly precipitation on the Upper Ross-Ade Watershed for long-term planning purposes. This approach is an alternative to 'design storm' approach for planning stormwater quantity and quality management. This has the additional justification in the fact that the synthetic data reflect the integrated effect of storms in the context of storage and treatment capacities of the system. Furthermore, simulation and synthetic generation of data is perhaps the only solution for obtaining long-term characteristics of quality because of the scarcety of observed quality data for long periods. A statistical analysis on 'events' generated by 'STORM' is performed to obtain long-term statistics of quantity and quality of stormwater. Also attempted, are the development of regression relationships, frequency-duration relationship of 'events' and 'time series' analysis of monthly series of rainfall, runoff, suspended solids and BOD of events. The results seem to justify the desirability of this type of analysis. Also demostrated is the usefulness of combined use of 'STORM' along with 'ILLUDAS' to provide necessary input for the economic analysis of stormwater management system.
W79-00521

ENVIRONMENTAL IMPACT COMPUTER SYSTEM ATTRIBUTE DESCRIPTOR PACKAGE, REFERENCE DOCUMENT.
Construction Engineering Research Lab., Champaign, IL.
For primary bibliographic entry see Field 7A.
W79-00652

METHODS TO EFFECT COST REDUCTIONS IN MUNICIPAL WATER SYSTEMS,
Mississippi Univ., University Bureau of Business and Economic Research.
For primary bibliographic entry see Field 6C.
W79-00678

DECISION THEORY APPLICATIONS AND IRRIGATION OPTIMIZATION,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 3F.
W79-00857

ENVIRONMENTAL DATA MANAGEMENT: THE IDENTIFICATION OF OUTLIERS,
Kentucky Univ., Lexington. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W79-00863

6B. Evaluation Process

PROBLEM-RESEARCH ANALYSIS IN THE U.S. VIRGIN ISLANDS INSULAR REGION, ATLANTIC SUBREGION,
College of the Virgin Island, St. Thomas. Caribbean Research Inst.
A. E. Pratt, and T. M. Vaughan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 042, Price codes: A03 in paper copy, A01 in microfiche. Virgin Islands Water Resources Research Center, Technical Report No. 1, February 1978. 23 p, 1 tab, append. OWRT B-001-VI(1), B-001-VI.

Descriptors: *Water resources, *Virgin Islands, *Water supply, *Conservation, *Analysis, Water quality, Water resources development, Water management(Applied), Conferences, Water quality control, Waste treatment, Recycling, Water treatment, Surveys, Data collections.

A problem-research analysis was carried out to identify the major researchable water problems in the U.S. Virgin Islands and to establish a rank of importance of urgency in the problems identified. This was done using a questionnaire distributed to persons considered to have an interest or involvement in water resources and also using three workshops which discussed the problems of meeting the increasing demands on the Islands' water resources and the role of research in solving the more urgent needs. The most severe water-related problems were condensed into four major categories: (1) alternatives in water supply; (2) conservation and water re-use; (3) water quality and waste management; and (4) social, economic, and institutional problems in water resources planning and management.
W79-00511

THE ECONOMIC REALITIES OF DROUGHT,
C. E. Harshbarger, and M. Duncan.
Federal Reserve Bank of Kansas City Monthly Review, May 1977, p 3-13. 2 fig, 9 ref.

Descriptors: *Droughts, *Economics, *Agriculture, *Crop production, *Income, *Debt, Farm management, Water shortage, Great Plains, Pacific Coast region, California, History, Wheat, Real property, Farms, Policy, Loans, Banks, Prices, Equity.

The economic effects of drought on agriculture are discussed from the perspective of severe water shortages in the southern Great Plains and the Pacific Coast region since 1973. The analysis is especially geared to the Tenth District of the Federal Reserve System (Nebraska, Kansas, Oklahoma, New Mexico, Missouri, Colorado and Wyoming). Wheat production for the U.S. and the Tenth District is given in charts for 1928-37 and 1947-56; it is noted that drought rarely leads to sharp rises in retail food prices in the short run. The aggregate farm balance sheet indicates a healthy and profitable agricultural industry, with an increase in the value of all farm assets from $281 billion in 1968 to $634 billion in January 1977. In constant dollars this represents a gain of about 27%. Net farm income increased from $12.2 to $24 billion over the same period, and per capita disposable personal income of farmers as a percentage of nonfarm income was 89.5% in 1975, compared with 47.7% in 1956 and the peak of 109.3% in 1973. However, persistence of the drought for another year or two in the grain belt and far west would have serious consequences for the nation. In addition, despite very favorable grain prices in the mid-1970s, the substantial gains in farm assets and proprietor's equities depended heavily on borrowed capital; total farm debt in January 1977 was $101.5 billion. A substantial number of recent entrants into farming having low equity could be forced out of business as a result of prolonged income reductions. Various farm policy alternatives are discussed, with emphasis on loans. (Lynch-Wisconsin)

W79-00582

MARKET IMPERFECTIONS AND THE OPTIMUM RATE OF DEPLETION OF NATURAL RESOURCES,
For primary bibliographic entry see Field 6C.
W79-00583

THE EXPLOITATION OF EXTRACTIVE RESOURCES: A SURVEY,
F. M. Peterson, and A. C. Fisher.
The Economic Journal, Vol. 87, December 1977, p 681-721. 5 fig, 248 ref.

Descriptors: *Resource depletion, *Natural resources, *Reviews, *Economics, *Extractive resources, *Bibliographies, Exploitation, Optimization, Renewable resources, Model studies, Non-renewable resources, Welfare(Economics), Resource allocation.

A critical and analytical comprehensive literature survey is presented of natural resource extraction, especially models of optimal exploitation and studies of long-run resource depletion. A 248-entry bibliography is included. The first section on renewable resources covers: (1) a model of renewable resource use (Schaefer 1954, 1957), (2) the common property problem, and (3) extensions and empirical applications of the model associated with Schaefer. The section on nonrenewable resources includes: (1) static approaches to the theory of the mine; (2) a dynamic model; (3) extensions of the dynamic model (monopoly, exploration, uncertainty, and recycling; (4) the optimal rate of use; (5) intergenerational welfare; and (6) the potential exhaustion of natural resources. Two major conclusions emerge: (1) competitive markets allocate extractive resources about as well as they do other resources, and (2) though stocks are being physically depleted, erosion of the economy's resource base has been prevented by technical change, economies of scale, and product and factor substitution. In terms of sacrifices required to obtain extractive commodities, the latter have actually become less scarce over the past century. Nevertheless, with common property resources such as fisheries, either sole ownership or unitized management must be imposed to counteract overexploitation. Maximum sustainable yield will usually not be optimal, however. Other problems involve marginal user cost, relative prices of metals and fuels, external costs, and future uncertainties. (Lynch-Wisconsin)
W79-00584

OPTIMUM DEPLETION OF NATURAL RESOURCES: SOME GENERAL ISSUES,
Kansas Univ., Lawrence. Inst. for Social and Environmental Studies.
D. S. Dendrinos.
Socio-Economic Planning Sciences, Vol. 11, No. 4, 1977, p 233-234. 9 ref.

Descriptors: *Natural resources, *Environmental economics, *Economics, *Optimization, *Resource depletion, *Welfare(Economics), Theoretical analysis, Equity, Opportunity costs, Social values, Discount rates, Social impact, Cost-benefit analysis.

An analysis of equity issues in choosing optimal levels of resource depletion for present and future generations concludes that we should do now what is best now and that because of environmental planning uncertainties, planning time spans should be limited to the near future. Articles by Slow (1974) and Kay and Mirrlees (1975) are used as a basis for discussion. Published studies tend to show that market conditions will deplete a resource at an optimal rate if social marginal rates of substitution between opportunity costs of conserving or extracting the resource are equal to resource prices over time. Kay and Mirrlees hold that the extraction rate of the natural and non-reproducible resource, which results in the maximum present value of the discounted profits from exploiting the resource, also results in the maximum value of a social welfare function as defined by the sum of social utilities over time. Solow examines the impact of the Rawlsian criterion of maximizing the minimum level of social welfare incurred over time and shows that use of such a criterion for social optimization is inappropriate as it tends to perpetuate poverty. The main point in the literature is that the market rate of interest is a built-in stabilizer in the economy which regulates resource depletion at its socially optimum level. One questionable underlying assumption is that resource owners have perfect foresight concerning future prices, and can ascertain how much future generations will be willing to pay for a resource.
W79-00587

THE RELATIONSHIP BETWEEN COASTAL-ZONE MANAGEMENT AND OFF-SHORE ECONOMIC DEVELOPMENT,
Southampton Univ. (England). Dept. of Geography.
M. J. Clark.
Maritime Policy and Management, Vol. 4, No. 6, November 1977, p 431-449. 5 fig, 15 ref.

Descriptors: *Water management, *Water resources development, *Exclusive economic zne, *Coastal zone management, *Continental shelf, *United Kingdom, Coasts, Economic development, Oil industry, Economics, Law of the sea, Legislation, International agreements, Decision making, Planning, Policy, Offshore zone.

Comparative analysis of the exclusive economic zone (EEZ) proposed for international sanction and the coastal zone shows interrelationships sufficiently strong to justify referring to the latter in international EEZ conventions, national EEZ implementing legislation, and management planning. Economic development of the outer cntinental shelf, such as exploitation of North Sea oil, represents potentially massive impact on economic, social, and environmental systems, and poses a serious challenge to the coastal planning system. Establishment of an exclusive economic zone could further complicate such planning through encouraging accelerated exploitation of offshore resources, but could also offer a means of management improvement through international conventions and national legislation. It is doubtful that a single comprehensive legislative or planning mechanism could satisfy all requirements; separate frameworks for coastal and offshore decision-making would probably be necessary. However, statutory joint consultation and mutual monitoring would be essential. This paper discusses: (1) coastal zone management process, (2) biophysical and socioeconomic systems, (3) perception as a prelude to decision-making, (4) relationship between management and biophysical attributes, (5) strategies and criteria for decision-making, (6) coastal zone inputs to continental shelf planning, and (7) legislation and management procedure. (Lynch-Wisconsin)
W79-00593

COST-BENEFIT ANALYSIS AND ENVIRONMENTAL POLICY: A COMMENT (SMITH),
Resources for the Future, Inc., Washington, DC.
V. K. Smith.
KYKLOS, Vol. 30, No. 2, 1977, p 310-313. 10 ref.

Descriptors: *Cost-benefit analysis, *Policy, *Economics, *Environmental economics, Pollutants, Irreversibility, Pollution abatement, Externalities, Uncertainity, Resource allocation, Welfare(Economics), Optimization, Theoretical analysis, Dynamics, Discount rates.

This paper rebuts Pearce's 1976, (see W77-04561) conclusion that cost-benefit techniques have limited relevance where pollutant discharge rates exceed environmental assimilative capacity since irreversible stocks of these residuals accumulate. Pearce views cost-benefit analysis as static, and concludes that physical information alone will identify a welfare maximum in the case of cumulative pollutants. It is argued here that Pearce's analysis ignores contributions by Fisher, Krutilla, and Cichetti (1967-72) which offer amendments to traditional cost-benefit practices to account for the special character of irreversible allocation decisions. In addition, reliance on strictly biological criteria for defining an economic optimum ignores the relative values of alternative effects associated with each allocation and cannot, except by chance, result in a welfare maximum. Irreversibilities are important inter-temporal externalities which bring costs or benefits to future generations without their consent and without market-determined compensations. Fisher, Krutilla, and Cicchetti (1972) show that if benefits of an action decrease over time relative to benefits from pollution prevention, an optimal policy need only consider the present value of: (1) an immediate once-and-for-all action, and (2) no action. Arrow and Fisher (1974) demonstrate that in the case of an irreversibile action involving cost-benefit uncertainty, expected benefits should be reduced to reflect loss of options. (Lynch-Wisconsin)
W79-00596

COST-BENEFIT ANALYSIS AND ENVIRONMENTAL POLICY: A COMMENT (ELLIOTT AND YARROW),
Newcastle-upon-Tyne Univ. (England).
D. Elliott, and G. Yarrow.
KYKLOS, Vol. 30, No. 2, 1977, p 300-309. 4 fig, 3 ref.

Descriptors: *Cost-benefit analysis, *Environmental economics, *Policy, *Economics, *Mathematical models, Model studies, Optmization, Theoretical analysis, Equilibrium, Dynamics, Externalities, Equations, Pollutants, Pollution abatement, Welfare(Economics), Discount rates.

Pearce's 1976 argument (see W77-04561) that cost-benefit analysis is of limited value in environmental policy-making, and is often unnecessary in any case because optima can be ascertained using physical information alone, is rejected here. It is contended that, in general, an infinite number of ecological equilibria can exist; therefore, physical information is insufficient as a basis for policy formation. Cost-benefit analysis, with certain modifications to incorporate dynamic effects, is a useful conceptual framework for addressing a wide class of pollution problems. A simple model is developed in which a flow of damages (external effects) is generated by a pollution accumulated in the environment. An equation is derived which can be regarded as the dynamic analogue of the static cost-benefit rule: marginal cost of pollution abatement = marginal damage of the flow of pollutant. Three implications demonstrating the critical importance of the discount rate for the optimal path are deduced. Dynamic adjustments are then described, and an extension of the analysis to more complicated problems is illustrated. The overall presentation identifies relevant variables for determining the equilibrium rate of discharge and stock of pollutant, namely, the marginal damage of the stock of pollutant, the discount rate, time lags, and marginal rate of environmental absorption. Several informational difficulties associated with certain pollutants are briefly discussed. (Lynch-Wisconsin)
W79-00597

COST-BENEFIT ANALYSIS AND ENVIRONMENTAL POLICY: A REPLY TO ELLIOTT AND YARROW AND TO SMITH,
Aberdeen Univ. (Scotland). Dept. of Political Economy.
D. Pearce.
KYKLOS, Vol. 30, No. 2, 1977, p 314-318. 11 ref.

Descriptors: *Environmental economics, *Economics, *Discount rates, *Policy, *Cost-benefit analysis, Optimization, Pollution abatement, Pollutants, Equations, Model studies, Mathematical models, Welfare(Economics), Equilibrium, Dynamics, Theoretical analysis.

In this reply to 1976 critiques by Elliott and Yarrow and by Smith of the author's article on limitations of cost-benefit analysis in formulating environmental policy, Pearce first clarifies his suggestion that for some cases of environmental degradation, physical information alone will suffice to identify a long-run optimum; it was not claimed that cost-benefit analysis is frequently not needed. It was stated in the original paper that there exists a class of pollution contexts in which assimilation rate was itself a function of the amount of waste, and that some of these contexts necessarily generated an incompatibility between an ecological equilibrium and the neoclassical welfare optimum. Elliott and Yarrow's model omits the very context that generated the disputed conclusion, namely, that physical information alone may identify an optimum. Three points or questions can be raised: (1) The nature of the welfare function will determine whether the maximum ecological output is compatible with a long-run welfare optimum. (2) Can assimilative capacity in the X delta context adjust in some way to restore compatibility between ecological and economic sectors. (3) Elliott and Yarrow's assertion that the discount rate alters the original conclusions is correct, but discounting may not be appropriate in this context. Regarding Smith's comment, Krutilla and Fisher (1975) indeed demonstrate a relevant modification of cost-benefit analysis, but there remains no reason for blind adoption of discount rates. (see W77-04561; W79-00596 and W79-00597) (Lynch-Wisconsin)
W79-00598

HARBOR AND WATERFRONT DEVELOPMENT PLANNING,
Higher Education Center for Urban Studies, Bridgeport, CT.
For primary bibliographic entry see Field 2L.
W79-00657

STATE OF NORTH CAROLINA COASTAL MANAGEMENT PROGRAM AND DRAFT ENVIRONMENTAL IMPACT STATEMENT.
National Oceanic and Atmospheric Administration, Washington, DC. Office of Coastal Zone Management.
For primary bibliographic entry see Field 6G.
W79-00658

ASSESSING THE SOCIAL IMPACTS OF OIL SPILLS. PROCEEDINGS OF AN INVITATIONAL SYMPOSIUM.
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 5G.
W79-00661

ICHTHYOLOGICAL INVESTIGATION OF THE PROTECTED HABITAT OF THE DANUBIAN SALMON (L.) ON THE RIVER TURIEC)CZECHOSLOVAKIA) AND SUGGESTIONS FOR ITS MANAGEMENT, (IN SLOVAK),
Laboratorium Rybarstva a Hydrobiologie, Bratislava (Czechoslovakia).
I. Bastl, J. Holcik, and A. Kirka.
Ab Slov Nar Muz Prir Vedy 21, p 191-224, 1975.

Descriptors: *Alburnoides-bipunctatus, Alburnus-alburnus, Barbus-barbus, Chondrostoma-Nasus, Cobitis-taenia, Cottus-Gobio, *Czechoslovakia, Danubian, Esoc-lucius, Gobio-gobio, Habitats, Hucho-hucho, *Ichthyological studies, Ichthyomass, Leuciscus-cephalus, Leuciscus-leuciscus, Lota-lota, *Management, Noemacheilus-barbatulus, Phoxinus-phoxinus, Rivers, *Salmon, Salvelinus-fontinalis, Thymallus-thymallus, *Turiec River(Czech), Zingel-streber, *River Vah(Czech).

The ichthyological status of the protected habitat of the Danubian salmon in the Turiec River were assessed and some measures for enlargement of population of this fish and for management of the river were given. The study was carried out in the summer and autumn of 1968 using electric shocker, haul seine and angling in 4 localities of the protected stretch of the river. In 1 station quantitative estimation of abundance, ichthyomass and available production was performed in a 150 m stretch blocked by nets. The protected habitat is inhabited by 19 spp. of fish (Barbus barbus, Zingel streber, Thymallus thymallus, Esox lucius, Chondrostoma masus, Salmo trutta m. fario, S. gairdneri irideus, Salvelinus fontinalis, Hucho hucho, Phoxinus phoxinus, Cottus gobio, Leuciscus leuciscus, Gobio gobio, Alburnoides bipunctatus, Cobitis taenia, Noemacheilus barbatulus, Lota lota.) belonging to 8 families. At Moskovec estimated abundance was 12,088 fish weighing 484.72 kg/ha of area and available production was 302.2 kg/ha per yr. It was found that the Danubian salmon is a very rare species in the protected habitat and in the whole river. Due to heavy pollution flowing into the River Vah, the Danubian salmon's population became isolated. During the past 5 decades the population of Danubian salmon in the Turiec River was many times larger. The decrease of population of the Danubian salmon can be accounted for by fishing; the catching of juvenile specimen mistaken for trout; gradual worsening of environmental conditions due to industralization, river regulation and polution; rapidly increasing numbers of anglers, poaching and unsuitable and insufficient planting to fry.--Copyright 1977 Biologica Abstracts, Inc.
W79-00718

ECONOMIC IMPACT OF A PROPOSED CHANGE IN THE AMMONIA EFFLUENT STANDARDS, R77-6,
Illinois Inst. for Environmental Quality, Chicago.
For primary bibliographic entry see Field 5G.
W79-00789

ECONOMIC ANALYSIS OF EROSION AND SEDIMENTATION, SEVEN MILE CREEK SOUTHWEST BRANCH WATERSHED,
Illinois Univ. at Urbana-Champaign. Dept. of Agricultural Economics.
M. T. Lee, A. S. Narayanan, and E. R. Swanson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-274 687, Price codes: A03 in paper copy, A01 in microfiche. IIEQ Document No. 74-80, December 1974. 28 p, 11 fig, 8 tab, 12 ref.

Descriptors: *Sevenmile Creek Watershed (IL), *Watersheds(Basins), *Agriculture, *Crop production, *Cultivation, *Erosion control, Income, Illinois, Soil erosion, Crops, Rotations, Soil conservation, Economics, Farm management, Costs, Contour farming, Terracing, Soil loss, Corn(Field), Soybeans, Pastures.

Economic impact of changes in crop rotation, cultivation systems, and conservation techniques on soil erosion, farm income, and sediment damage was studied in Sevenmile Creek Southwest Branch Watershed in west-central White County, Illinois. The watershed is 60-70% row crops (corn and soybeans) and the rest is wheat and pasture. Short- and long-run effects of seven crop rotations, three cultivation methods (conventional, plow-plant, and chisel plow), and three planting techniques (up and down, contouring, and contouring and terracing) were analyzed. Short-run results (one year) showed that: (1) for all rotations maximum soil loss occurs with up-and-down cultivation, and minimum loss with contouring and terracing, and contouring alone; (2) conventional tillage produces highest soil loss and chisel plow the lowest; (3) highest soil loss (23.01 tons/acre) occurs under continuous corn with conventional tillage and up-and-down cultivation; (4) lowest soil loss (0.23 tons/acre) occurs under W-M-M-M (W=wheat, M=meadow hay) with chisel plow and contouring and terracing; (5) continuous corn produce the maximum net income/acre with all three tillage systems; and (6) the highest net return combination is continuous corn with chisel plow and up-and-down cultivation (58.25/acre). Long-run analysis yields similar results. Continuous corn gives the highest net social income (net farm income combined with cost of sediment damage) under all three tillage systems, and W-M-M-M the lowest. (Lynch-Wisconsin)
W79-00791

BUREAUCRATS VS. VOTERS: ON THE POLITICAL ECONOMY OF RESOURCE ALLOCATION BY DIRECT DEMOCRACY,
Carnegie-Mellon Univ., Pittsburgh, PA. Graduate School of Industrial Administration.
For primary bibliographic entry see Field 6E.
W79-00793

TRADITIONAL LAND USE IN MARGINAL DRYLANDS,
United Nations Environment Programme, Nairobi (Kenya); and Secretariat for International Ecology (Sweden).
For primary bibliographic entry see Field 4A.
W79-00797

A DYNAMIC SIMULATION OF REGIONAL ECONOMIC PERFORMANCE WITH ALTERNATIVE WATER POLICIES,
California Univ., Santa Barbara. Dept. of Economics.
L. J. Mercer, and W. D. Morgan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 409, Price codes: A05 in paper copy, A01 in microfiche. Technical Completion Report, Contribution No. 171, California Water Resources Center, August 1978, 83 p, 5 fig, 44 tab. (California Water Resources Center Project (UCAL-WRC-W-484).

Descriptors: *Water policy, *Computer models, *Water costs, *Water demand, Competing uses, Planning, *Simulation analysis, Model studies, *Regional analysis, *California, *Alternative planning, Alternative water use, Water utilization, *Water allocation(Policy), Prices, Economics.

A dynamic simulation model of the regional economy is developed and applied to seven subregions of the Central California Coastal Region to evaluate the effects of alternative water policies during 1970-1990. The regional model developed has four major sectors: demographic, labor, housing and land, and water. The last three sectors are developed in terms of a market with the underlying demand and supply forces modeled to simulate the market operation. A number of dynamic feedbacks are modeled among the several sectors and markets. Base simulations are run for all seven regions under two alternate water sector scenarios. In one, all water in the region is allocated among users by a single agency using shadow prices with the goal of maximizing net benefits from water use. In the second, a single agency in the same fashion allocates all regional water not pumped by individual users. Comparative policy simulations with these two scenarios are run with alternate water policies including housing restrictions, water supply augmentation, and enforcement of water basin safe yield. Major simulation outcomes with these alternate policies are compared to the base simulations and to each other. Based on the model developed, the results of these preliminary simulations suggest that reliance on the price mechanism for water allocation is the most effective water policy. (Snyder-Calif, Davis)
W79-00854

ECONOMIC BENEFITS TO AGRICULTURE IN THE SAN JOAQUIN VALLEY DUE TO LONG-TERM PREDICTION STREAMFLOW FORECASTING,
California Univ., Los Angeles. Dept. of Engineering Systems.
For primary bibliographic entry see Field 3F.
W79-00861

WHAT CONSTITUTES 'BENEFITS' FOR URBAN DRAINAGE PROJECTS,
Shoemaker and Wham, Denver, CO.
W. J. Shoemaker.
Denver Law Journal, Vol. 51, No. 4, p 551-565. 1974. OWRT B-113-COLO(5), 14-31-0001-5059.

Descriptors: *Benefits, Budgeting, Cities, Drainage, Drainage practices, *Drainage programs, *Economic justification, Feasibility, Financial feasibility, Flood plains, *Project benefits, Runoff, *Storm drains, *Cost-benefit analysis, Drainage law, Economic evaluation, Financing, *Urban drainage.

The need for adequate urban drainage and flood control systems in metropolitan areas is clear. However, implementation of such systems is being hindered by hesitancy of local officials to act in light of the statutory requirement that assessments be made according to 'benefits' received, while the meaning of 'benefits' remains undefined. The proposed statutory fefinition of 'benefit' would help to clarify the situation, and its enactment would be a positive step toward encouraging needed urban drainage improvements. The term 'benefits,' for the purpose of assessing a particular property within a drainage district (or special improvement district), may include any one or more of the following: Market value increase; reduced liability; greater use of property; alleviation of health hazards; reduction in maintenance costs; increased convenience; aesthetic or ecological improvements.
W79-00872

VISUAL LAND USE COMPATIBILITY AS A SIGNIFICANT CONTRIBUTOR TO VISUAL RESOURCE QUALITY,
Massachusetts Univ., Amherst. Dept. of Landscape Architecture and Regional.
W. G. Hendrix, and J. Gy Fabos.
International Journal of Environmental Studies, Vol 1, p 1-8, 1974. 3 fig, 25 ref. OWRT B-029 MASS(1). 14-31-0001-3897.

Descriptors: *Planning, *Land use, Landscapes, *Visual resource assessment, *Model studies, *Metropolitan Landscape Planning Model.

An alternative to landscape complexity as a measure of visual landscape quality is presented. This alternative is called visual land use compatibility and is defined as the relationship between adjacent land uses. The research described is part of an interdisciplinary project at the University of Massachusetts called the Metropolitan Landscape Planning Model (METLAND). Man's concern for the relationships between land uses is discussed, tracing that concern through history to the present. A procedure that was designed to measure perceptions of the visual aspects of these land use relationships is described. It appears to be valid to extend the concept of 'misfits' into a more general model of both desirable and undesirable aspects of land use relationships. Further research to develop that model is proposed.
W79-00873

USER'S MANUAL FOR PREMINING PLANNING OF EASTERN SURFACE COAL MINING, VOLUME I: EXECUTIVE SUMMARY,
Pennsylvania State Univ., University Park. Dept. of Mineral Engineering.
For primary bibliographic entry see Field 5G.
W79-00877

ECONOMIC IMPACT OF FOSSIL ENERGY ALTERNATIVES ON CALIFORNIA IRRIGATED AGRICULTURE,
California Univ., Davis. Dept. of Agricultural Economics.
W. E. Johnston, R. M. Adams, and G. A. King.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 408, Price codes: A03 in paper copy, A01 in microfiche. Contribution 170, Water Resources Center, University of California June 1978. 35 p, 2 fig, 17 tab, 48 ref. (California Water Resources Center Project UCAL-WRC-W-483).

Descriptors: *Energy, *Fuels, *Water costs, *Cost analysis, Economic efficiency, *Economic impact, *Alternative water use, Irrigation, Agriculture, Model studies, Crop production, *California.

Some effects of alternative energy scenarios are analyzed for their short-run impacts on the level of production and the product mix of annual field crops and vegetables in California. The scenarios focus on the impacts of fuel and fertilizer cost increases and reduced supplies through a quadratic programming model of regional production of nine field crops and 28 seasonal vegetable crops. The short-run model considers soil type and water availability as constraints to the problem and in the case of water does not permit alteration in historical regional mixes of surface and ground water. Effects of the use of statewide versus regional energy allocations and of the introduction of an initial measure of producer risk are examined in model results. Price, quantity, acreage, and welfare effects are noted for the alternatives of regional energy allotments, increased energy prices, and statewide reductions in energy supplies. The welfare effects are examined in terms of changes in consumers' and producers' surpluses. (Snyder-Calif Davis)
W79-00908

ECONOMIC IMPACT OF FLOODING ON AGRICULTURAL PRODUCTION IN NORTHEAST CENTRAL NORTH DAKOTA,
North Dakota State Univ., Fargo. Dept. of Agricultural Economics.
J. A. Leitch, and F. Scott.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 420, Price codes: A04 in paper copy, A01 in microfiche. Agricultural Economics Report No. 120, August 1977. 57 p, 4 fig, 32 tab, 5 append. OWRT A-043-NDAK(3), 14-31-0001-5034.

Descriptors: *Flood damage, Wetlands, Drainage, Attitudes, *Agriculture, *Economic impact, Flood control, *North Dakota.

Two farm operator surveys were conducted in the Devils Lake Basin of North Dakota to collect information on farmer attitudes and dollar losses associated with flooding of agricultural land. A preliminary survey was drawn to assess farm operator attitudes toward wetland, drainage, and flooding; and to identify problem areas relative to collecting information on dollar losses due to flooding. Respondents felt that wetlands were a nuisance to their farm operations and should be drained. One-third of the respondents felt their flood problems were associated with drainage upstream. A detailed survey was conducted to estimate flood damage on the basis of a composite acre for the Basin. The estimated annual average loss on land that may be affected by flooding in the Devils Lake Basin was $8.71 using long-run price relationships, and $13.03 using 1974 price relationships. The annual average total dollar loss due to flooding in the entire Basin was estimated to be $1.9 million using long-run price relationships, and $2.9 million using 1974 price relationships. A methodology for determining composite flood losses is presented.
W79-00911

PRINCIPLES OF WATER RESOURCES PLANNING (PHASE II),
Rutgers - The State Univ., New Brunswick, NJ. Water Resources Research Inst.
W. Whipple, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 317, Price codes: A03 in paper copy, A01 in microfiche. Partial Technical Completion Report, November 1978. 26 p. OWRT A-048-NJ(5), 14-34-0001-8032.

Descriptors: *Regional analysis, *Discount rates, *Interest rates, *Environment, *Social aspects, *Planning, *Ecology, Waste treatment, Water quality, Economics, *Indirect effects, *Regional sewerage systems.

As part of a broad attempt to define principles which should govern water resource planning, an analysis has been made of three outstanding problems. The first subject is the discount rate. Analysis indicates that current governmental policy appears to require a rate higher than would be desirable on social and economic grounds. The second subject is the evaluation of environmental quality. In spite of many conflicting ideas the basic concept appears to be to provide for man's health and enjoyment as regards living space, working space and recreation space. Methodology for measuring and evaluating is investigated. The third subject is the so-called regional sewerage systems. Economic strengths and weaknesses, social, economic and environmental indirect effects, and some institutional problems were examined.
W79-00913

THE CURRENT STATE OF EMERGENCY PLANNING FOR WATER SUPPLY IN THE SAN DIEGO AREA,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00923

THE TRENTON WATER CRISIS OF 1975: IMPRESSIONS AND ANALYSIS,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00926

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

THE ECONOMIC REALITIES OF DROUGHT,
For primary bibliographic entry see Field 6B.
W79-00582

MARKET IMPERFECTIONS AND THE OPTIMUM RATE OF DEPLETION OF NATURAL RESOURCES,
F. Khalatbari.
Economica, Vol. 44, No. 176, November 1977, p 409-414. 8 ref.

Descriptors: *Economics, *Optimization, *Resource depletion, *Common pools, *Property rights, *Exhaustible resources, Environmental economics, Natural resources, Model studies, Mathematical models, Equations, Taxes, Bias, Oligopoly, Subsidies, Prices, Interest rates, Market value.

A model is constructed to analyze the significance of common pools in the economics of exhaustible natural resources. Imperfectly defined property rights is one of two broad categories of market imperfections at length in the literature (with noncompetitive resource owners); both contribute to biases in the exploitation rate of an exhaustible natural resource. Biases are discussed here in light of the accepted theory that with negligible extraction costs the pace of resource extraction under fully competitive conditions is such that the market price raises at the rate of interest. Belief that

common property must lead to overextraction has generated regulations controlling extraction. If two or more people have access to the same pool, it is presumed that each owner will try to deplete the resource at a higher rate than would be the case with well-defined property rights. This analysis assumes there is a fixed and finite number of extractors having access to the pool, which is large relative to total reserves. The model demonstrates that stocks are depleted quicker in the common pool case than in the oligopolistic case. Should any biases owing to the oligopolistic market (compared with the socially controlled market) be in the direction of resource under-utilization, common pools could speed up depletion, therefore approximating the socially desirable depletion pattern and preventing waste. The optimum tax policy is also derived. (Lynch-Wisconsin)
W79-00583

THE EXPLOITATION OF EXTRACTIVE RESOURCES: A SURVEY,
For primary bibliographic entry see Field 6B.
W79-00584

OPTIMUM DEPLETION OF NATURAL RESOURCES: SOME GENERAL ISSUES,
Kansas Univ., Lawrence. Inst. for Social and Environmental Studies.
For primary bibliographic entry see Field 6B.
W79-00587

TO TELL THE TRUTH: IMPERFECT INFORMATION AND OPTIMAL POLLUTION CONTROL,
Massachusetts Inst. of Tech. Cambridge.
For primary bibliographic entry see Field 5G.
W79-00588

ENVIRONMENTAL QUALITY AND GAINS FROM TRADE,
Mannheim Univ. (West Germany).
For primary bibliographic entry see Field 5G.
W79-00589

COST-BENEFIT ANALYSIS AND ENVIRONMENTAL POLICY: A COMMENT (SMITH),
Resources for the Future, Inc., Washington, DC.
For primary bibliographic entry see Field 6B.
W79-00596

COST-BENEFIT ANALYSIS AND ENVIRONMENTAL POLICY: A COMMENT (ELLIOTT AND YARROW),
Newcastle-upon-Tyne Univ. (England).
For primary bibliographic entry see Field 6B.
W79-00597

COST-BENEFIT ANALYSIS AND ENVIRONMENTAL POLICY: A REPLY TO ELLIOTT AND YARROW AND TO SMITH,
Aberdeen Univ. (Scotland). Dept. of Political Economy.
For primary bibliographic entry see Field 6B.
W79-00598

METHODS TO EFFECT COST REDUCTIONS IN MUNICIPAL WATER SYSTEMS,
Mississippi Univ., University Bureau of Business and Economic Research.
W. E. Boyet, K. W. Hollman, S. C. Shull, and R. S. Glaze.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 315, Price codes: A03 in paper copy, A01 in microfiche. Mississippi State University, Mississippi State Water Resources Research Institute Report, September 1978. 33 p, 4 tab. OWRT A-116-MISS(2), 14-34-001-8026.

Descriptors: Economies, Costs, Potable water, Water purification, *Economies of scale, *Cost comparisons, Returns to scale, *Planning, Budgeting, Decision making, Water allocation, Management, Model studies, Regression analysis.

The project involved the development of a model for isolating the variables which affect significantly the cost of water sold by Mississippi municipal water systems. Multiple regression analysis was used in the development of the predictive equations. The results provide information regarding the elasticity of cost with respect to size, as well as the relative impact of other physical, financial, and socioeconomic variables on water cost. The following procedure was used: (1) A cross section of 88 Mississippi municipal water firms comprised the study group; (2) Information on the selected systems was collected by means of interviews and from financial records and other secondary sources; and (3) Variables included in the analysis were: (a) number of customers served, (b) gallons of water sold, (c) expenses by various kinds of disaggregation, (d) source of water, (e) well depth, (f) area served in square miles, and others. Knowledge of the effect of these variables on the cost of water will assist policy makers in water system planning. Since the report is concerned with economies of scale, it will also be helpful to State water regulatory authorities in assessing the merits of consolidating smaller systems into larger operational units.
W79-00678

ANALYSIS OF ECONOMIC EFFECTS OF ENVIRONMENTAL REGULATIONS ON THE INTEGRATED IRON AND STEEL INDUSTRY. VOLUME I.
Temple, Barker and Sloane, Inc., Wellesley Hills, MA.
For primary bibliographic entry see Field 5G.
W79-00788

ECONOMIC IMPACT OF PROPOSED THERMAL DISCHARGE STANDARD FOR LAKE SANGCHRIS,
Oberlin Coll., OH.
For primary bibliographic entry see Field 5G.
W79-00792

A SELECTED ANNOTATED BIBLIOGRAPHY OF ECONOMIC VALUES OF FISH AND WILDLIFE AND THEIR HABITATS,
North Dakota State Univ., Fargo. Dept. of Agricultural Economics.
J. A. Leitch, and D. F. Scott.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 433, Price codes: A07 in paper copy, A01 in microfiche. Agricultural Economics Miscellaneous Report No. 27, August 1977. 132 p. OWRT B-034-NDAK(1), 14-34-0001-7127.

Descriptors: *Bibliographies, *Economics, *Values, *Fish, *Widlife, Habitats.

This selected annotated bibliography of economic values of fish and wildlife with 691 entries is organized into the following eight general categories: (1) Wetland Economics; (2) Economics of Fish and Wildlife and Their Habitats; (3) Miscellaneous Evaluation Techniques with Application to Fish and Wildlife; (4) Socioeconomic Characteristics of Hunters and Fishermen; (5) Outdoor Recreation Economics; (6) Natural Resource Economics; (7) Water Resource Economics Related to Fish and Wildlife; and (8) Bibliographies. An alphabetical author index is provided. Government document numbers and Ph.D dissertation abstract numbers are given for many of the references.
W79-00912

6D. Water Demand

ESTABLISHING CROP ACREAGE FLEXIBILITY RESTRAINTS FOR SUBREGIONS OF THE TEXAS HIGH PLAINS,
Texas A and M Univ., College Station.
G. D. Condra, and R. D. Lacewell.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 354, Price codes: A03 in paper copy, A01 in microfiche. Texas Water Resources Institute Technical Report No. 82, January 1977. 27 p, 5 tab, 18 ref. OWRT A-037-TEX(1).

Descriptors: *Mathematical models, *Computer models, *Acreage, *Crops, *Water demand, *Texas, Agriculture, Forecasting, Flexibility restraints, Crop production, Climatic data, Model studies, Regional analysis, Regression analysis, Statistical models, Statistical methods.

Constraints needed in cropping pattern shifts in linear programming models used to derive water and other input demand for major crop acreages in subregions of the Texas High Plains were studied. Such constraints, referred to as flexibility restraints, are needed because of institutional, marketing machinery, and price uncertainty factors. Alternative estimating models for establishing acreage flexibility were developed and the results of these models in estimating flexibility restraints were evaluated using statistical measures and subjective analysis. Models analyzed ranged from a simple linear regression model, in which the current year's acreage is expressed as a function of last year's acreage, to a multiple regression model in which economic and climatological variables were considered. The multiple regression model did not give satisfactory results; however, the simpler models did perform acceptably. One of these was selected, based on statistical measures and a prioria expectations, and used to calculate crop acreage flexibility restraints for three subregions of the Texas High Plains. (Majtenyi-IPA)
W79-00505

PROBLEM-RESEARCH ANALYSIS IN THE U.S. VIRGIN ISLANDS INSULAR REGION, ATLANTIC SUBREGION,
College of the Virgin Island, St. Thomas. Caribbean Research Inst.
For primary bibliographic entry see Field 6B.
W79-00511

ENVIRONMENTAL QUALITY EXPENDITURE PATTERNS AND URBAN LOCATION: EFFECTS ON INCOME GROUPS,
Ottawa Univ. (Ontario), Dept. of Geography and Regional Planning.
For primary bibliographic entry see Field 6G.
W79-00586

A DYNAMIC SIMULATION OF REGIONAL ECONOMIC PERFORMANCE WITH ALTERNATIVE WATER POLICIES,
California Univ., Santa Barbara. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W79-00854

DECISION THEORY APPLICATIONS AND IRRIGATION OPTIMIZATION,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 3F.
W79-00857

ECONOMIC IMPACT OF FOSSIL ENERGY ALTERNATIVES ON CALIFORNIA IRRIGATED AGRICULTURE,
California Univ., Davis. Dept. of Agricultural Economics.

For primary bibliographic entry see Field 6B.
W79-00908

WORKING PAPER NOS. 7 - 10 OF THE EMERGENCY WATER ALLOCATION PROJECT, (7) IMPLEMENTATION OF A PREPAREDNESS PROGRAM; (8) ACHIEVING EQUITABLE AND EFFECTIVE WATER ALLOCATION; (9) RESTORATION OF A WATER DISTRIBUTION NETWORK; (10) IMPROVING EMERGENCY PREPAREDNESS,
California Univ., Irvine. School of Engineering; and California Univ., Irvine. Graduate School of Administration.
For primary bibliographic entry see Field 4A.
W79-00919

WORKING PAPER NO. 11 OF THE EMERGENCY WATER ALLOCATION PROJECT, MANUAL FOR WATER SERVICE EMERGENCIES FOR THE POWAY MUNICIPAL WATER DISTRICT,
California Univ., Irvine. School of Engineering; and California Univ., Irvine. Graduate School of Administration.
For primary bibliographic entry see Field 4A.
W79-00920

AN OUTLINE FOR THE STUDY OF EMERGENCY WATER ALLOCATION PROCEDURES,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00921

A CONCEPTUAL MODEL OF THE WATER DELIVERY SYSTEM IN THE SAN DIEGO AREA,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00922

6E. Water Law and Institutions

THE POLITICS OF HYDROELECTRIC POWER IN ALASKA: RAMPART AND DEVIL CANYON--A CASE STUDY,
Alaska Univ., College. Inst. of Water Resources.
C. M. Naske, and W. R. Hunt.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 116, Price codes: A04 in paper copy, A01 in microfiche. Report No. IWR-87, Jan 1978. 60 p, 74 ref, append. OWRT A-060-ALAS(1).

Descriptors: *Alaska, *Hydroelectric plants, *Decision making, *Planning, *Project post-evaluation, *Political aspects, Social aspects, Governments, State governments, Water resources development, Federal Government, Governmental interrelations, Area development, Environment, Environmental effects, Environmental control, Water utilization, History.

The decision making process involved in development of hydroelectric projects in Alaska is reviewed. Three projects are discussed: Eklutna, which is presently functioning; Rampart, which was not constructed; and Devil Canyon, which is still being planned. Although all three projects have different locations and goals, their histories reveal all the essential elements involved in hydroelectric power construction projects. The roles of several government agencies and the public were assessed. Factors in the power debate, such as environmentalist position, political support, newspaper coverage and sponsorship, and official commitments were examined. Neither corruption nor misrepresentation were involved in the decision to abandon the Rampart project. The situation evolved due to choice of strategy in reaching a desired political conclusion.
W79-00512

A PROPOSED REVISION OF KENTUCKY'S WATER RIGHTS LEGISLATION,
Kentucky Water Resources Research Inst., Lexington.
R. C. Ausness.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-288 335, Price codes: A07 in paper copy, A01 in microfiche. Research Report No. 114, October 1978. 140 p, append. OWRT A-070-KY(1), 14-34-0001-7038, 14-34-0001-8019.

Descriptors: *Legal aspects, *Legislation, *Water law, Water policy, Water resources development, *Kentucky, *Water rights, Regulation, Withdrawal, Water wells.

Kentucky's present system of water law consists of a statutory water withdrawal permit system superimposed upon a body of common-law water rights doctrine. The rights of water users are often uncertain under this system, particularly in periods of water shortage. The proposed revision of Kentucky's existing water rights legislation would greatly reduce the significance of common-law water rights and would remedy some of the weaknesses in the present statue. Part 1 of the proposed statute establishes an administrative structure; Part 2 deals with water withdrawal permits; Part 3 retains the present statute's provisions on the regulation of dams and impoundments, while Part 4 sets forth the powers and responsibilities of the Kentucky Water Resources Authority. Part 5 deals with regulation of water wells. (Huffsey-Ky)
W79-00524

THE RELATIONSHIP BETWEEN COASTAL-ZONE MANAGEMENT AND OFF-SHORE ECONOMIC DEVELOPMENT,
Southampton Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 6B.
W79-00593

THE CONTINENTAL SHELF AND THE EXCLUSIVE ECONOMIC ZONE: THE PROBLEM OF DELIMITATION AT UNCLOS III,
University of Wales Inst. of Science and Technology, Cardiff. Centre for Marine Law and Policy.
E. D. Brown.
Maritime Policy and Management, Vol. 4, No. 6, October 1977, p 377-408. 106 ref, 1 append.

Descriptors: *UNCLOS III, *Continental shelf, *Exclusive economic zone, *Oceans, *Law of the sea, *Water law, Legal aspects, Boundary disputes, Water rights, United Nations, Water resources, Water policy, United Kingdom, Zones, Commercial fishing.

A critical analysis is presented of proposed rules delimiting boundaries of oceanic continental shelves and exclusive economic zones (EEZ), to be considered by the Sixth Session of the Third United Nations Conference on the Law of the Sea (UNCLOS III), meeting May-July 1977. Much work is needed on the draft of the rules, contained in the Revised Single Negotiating Text (RSNT), before agreement can be reached. Six zones are currently recognized in the seas: (1) internal waters, (2) continental shelf, (3) exclusive fishing zone, (4) territorial sea, (5) contiguous zone, and (6) high seas. The EEZ concept is now in an advanced development stage. The continental shelf of a coastal state is defined in RSNT (Article 64) as 'the sea-bed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured....' Regarding the EEZ of a coastal state, Article 44(1) of the RSNT refers to 'an area beyond and adjacent to its territorial sea, described as the exclusive economic zone.' Article 45 provides that 'the exclusive economic zone shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured.' An appendix discusses the boundaries of the United Kingdom. (Lynch-Wisconsin)
W79-00594

COLORADO RIVER WATER CONSERVATION DISTRICT V. UNITED STATES: AN INCREASED ROLE FOR STATE COURTS IN THE ADJUDICATION OF FEDERAL RESERVED WATER RIGHTS,
S. O. Gaufin.
Utah Law Rev., Vol 1977, No. 2, p 315-29, 1977.

Descriptors: *Colorado River, *Federal-State water rights conflicts, *Federal reservations, *Judicial decisions, Adjudication procedure, Water rights, State jurisdiction, Federal jurisdiction, Jurisdiction, Reservation doctrine, Federal government.

In Colorado River Water Conservation District v. United States, the United States brought suit in federal district court on its own behalf and as trustees for certain Indian tribes seeking a declaration of its rights to water in Colorado Water Division No. 7. The government based its claim on the federal reserved water rights doctrine and state law. Defendants then sought adjudication of the identical issues in state court, and joined the federal government as defendant pursuant to the McCarren Amendment, which provides for a general waiver of immunity of state laws by the federal government in water rights suits against it. The federal court dismissed the government's suit because of the abstention doctrine. The Supreme Court upheld this dismissal, holding that the policy of the McCarren Amendment forced adjudication in a state proceeding. Analyzing this decision, the author concludes that the purpose of the decision was to authorize state court adjudication in addition to, but not to the exclusion of, federal adjudication. The author fears the Colorado River decision will nevertheless give state courts almost exclusive jurisdiction over general-adjudication-of-water-rights cases. (Horwich-Florida)
W79-00599

STATE AND FEDERAL REGULATION OF THE FLOOD PLAIN,
P. Hogan.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida 32611, $1.75. 1978. 37 p.

Descriptors: *Flood plains, *Flood plain zoning, *Flood plain insurance, *Local governments, Regulation, Governmental interrelations, Legislation, Florida, Disasters, Flood protection, Planning, Federal government.

A flood plain is an area adjacent to a river, lake or ocean that is subject to periodic flooding, either riverine or coastal. How often this can be expected to occur, and the period of the flood, is particularly important to the flood insurance industry. These are determinative factors in deciding what risks an insurance company will take. The standard by which flood plains are measured is the '100-year flood', or the flood level which has a one percent chance of occurring in any year at a given location. Maps issued by the Federal Insurance Administration are used by communities to determine whether flood insurance is needed and, if so, what rates are applicable. Florida has enacted much legislation in an effort to combat losses due to floods. The legislation lies in the areas of water management and zoning. The federal government possesses extensive authority in the flood control domain. Sources for this authority are the 'commerce' and 'welfare' clauses of the federal Constitution. The city of Palm Bay, Florida, lies in a flood plain. The report examines the city's

response to the flood insurance problem, and enumerates pertinent provisions of its Flood Plain Zoning Ordinance. (Spiegel-Florida)
W79-00600

MANDATORY DEDICATION AND IMPACT FEES: A MEANS OF SHARING THE BURDEN OF GROWTH IN THE MELBOURNE-TILLMAN DRAINAGE DISTRICT,
A. B. Corey.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida, 32611, $1.75. 1978. 32 p.

Descriptors: *Florida, *Public utilities, *Community development, *Cost sharing, Drainage districts, Costs, Facilities, Land use, Land development, Utilities, Treatment facilities.

In new community developments, it is imperative to determine at the earliest developmental stage who is to provide necessary services--such as water and sewers--local government or developers. Two methods of shifting the burden of providing these necessary services--such as water and sewers--local government or developers. Two methods of shifting the burden of providing these necessary services to the new residents who create the need are discussed: impact fees and mandatory dedications. The author suggests that impact fees are the more feasible method. One advantage of impact fees is that they are levied at the time building permits are issued, not at the time of the platting of the new subdivision. And impact fees generate revenue faster than tax assessment. Also, impact fees have a stronger predicate in Florida law than does mandatory dedication because the state Supreme Court has already ruled that municipalities have the authority to impose such fees. Other jurisdictions have upheld impact fees not only for water and sewer services, but for recreational facilities, fire protection, and educational facilities. On the other hand, the constitutionality of mandatory dedication ordinances has been litigated only as high as the appellate level in Florida and thus awaits state Supreme Court resolution. (Horwich-Florida)
W79-00601

FLORIDA COASTAL ZONE MANAGEMENT: AN ANALYSIS,
C. Fox.
Available from Eastern Water Law Center, University of Florida, Gainesville, Florida, 32611, $1.75. 1978. 32 p.

Descriptors: *Florida, *Coasts, *Management, *Administrative decisions, Administrative agencies, Legislation, Federal project policy, Cost sharing, State government, Regulation, Beaches, Comprehensive planning.

The Florida Coastal Coordinating Council was created in 1970. Its purpose was to implement what had appeared to be Florida's progressive coastal management program. After eight years with the Council now eight years old, doubts now exist as to the true concern of the Florida legislature for the coastal zone. Florida's present position concerning its coastal management program under the 1972 federal Coastal Zone Management Act (CZMA) is evaluated. Prior unsuccessful legislative attempts are discussed and reasons for the non-passage of the bills put forth and evaluated. Certain advantages accrue by obtaining federal approval under the CZMA. Two basic incentives exist. They are: the promise of federal consistency with state management programs, once approved; and monetary incentives to defray developmental and administrative program costs. Both are important factors. Also, the variety of financial assistance provided to help deal with impacts of energy facilities on the coastal zone must be considered. Finally, recommendations are made for future actions by Florida's legislature to move toward the goals established by it in 1970, concurrent with the creation of the coastal coordinating council. (Spiegel-Florida)
W79-00602

THE ICEBERG COMETH.: INTERNATIONAL LAW RELATING TO ANTARCTIC ICEBERG EXPLOITATION,
T. R. Lundquist.
Natural Resources Journal, Vol. 17, No. 1, p 1-41, January, 1977.

Descriptors: *Antarctic, *Icebergs, *Freshwater water supply development, Oceans, Sea ice, Melt water, Appropriation, Potable water, Resources development, Exploitation, Technology.

One solution to the anticipatedf problem of lack of fresh water is the utilization of Antarctic icebergs. The author reviews the existence of suitable technology, economic feasibility and possible environmental impact of iceberg utilization, and agrees with the conclusions of several other studies--that iceberg water is in fact a viable, 'least-cost' alternative in many situations. The legal status of Antarctica, and the legal impediments to iceberg exploitation are examined. Eighteen nations, referred to as the Antarctic Treaty Group (ATG), have historically asserted territorial claims or have acceded to the Antarctic Treaty which reserves the continent for peaceful purposes and guarantees freedom of scientific research. However, the Treaty is not binding on non-party nations, and it contains no provision regarding resource exploitation. Attempts by the ATG to resolve this resource allocation problem are examined. The United States' position, backed by considerable authority, is that because of the absence of any coastal sovereign, the high seas extend up to the Antarctic coastline. High seas rights are excluded from application of the Treaty, and thus Antarctic icebergs may be appropriated by Treaty and non-Treaty nations alike. (Stump-Florida)
W79-00603

RECLAMATION ACT OF 1902: AFTER 75 YEARS, 160 ACRE LIMITATION HELD VALID,
C. Lackmann.
Natural Resources Journal, Vol. 17, No. 4, p 673-78, October, 1977.

Descriptors: *Federal reclamation law, *Land tenure, *Irrigation districts, *Judicial decisions, Reclamation, Legislation, Irrigation, Federal government, Farms, Water rights, California.

The federal Department of the Interior (Department) brought suit to enforce compliance with Section 46 of the Omnibus Adjustment Act. The Section 46 puts a 160-acre limitation on irragable land an individual can own in an irrigation district receiving Bureau of Reclamation project water. In a companion case, non-landowner residents of Imperial Valley, California, sought enforcement of Section 5 of the 1902 federal Reclamation Act. Section 5 requires that a landowner receiving federal reclamation project water must be either a resident of the land benefited or residue in the immediate vicinity of that land. The federal government lost both cases. On appeal, the Court of Appeals stated that landowners do not impair any present perfected water rights of the District itself. Although landowners relied on the Department's practice of non-enforcement of Section 46, the court rejected this argument and reversed the lower court. The author concludes that the court's decision represents a victory for, and a step towards, preservation of the 'family farm'. Both cases will probably be appealed. (Spiegel-Florida)
W79-00604

IMPACT OF ENERGY DEVELOPMENT ON COLORADO RIVER WATER QUALITY,
Utah State Univ., Logan. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5G.
W79-00605

WHERE DO ENVIRONMENTAL LAWS AND REGULATIONS STAND TODAY.,
Environment Information Center, Inc., New York.
For primary bibliographic entry see Field 5G.
W79-00607

'THE COMMON HERITAGE OF MANKIND': RESOURCE MANAGEMENT OF THE INTERNATIONAL SEABED,
S. Kotz.
Ecology Law Quarterly, Vol. 6, No. 1, p 65-108, 1976.

Descriptors: *Law of the sea, *Natural resources, *Exploitation, *United Nations, Mining, Oceans, International law, International waters, Economic impact, Environmental effects, Marine geology, Negotiations.

In the past, the freedom of the sea concept has governed the development of ocean law. The result of this policy was the domination of the great maritime powers in the field of seabed exploitation. Recently, the developing countries have sought to abandon past policy and institute, by means of a solid majority in the United Nations, an allocation of ocean resources favoring their own development. Developing coastal states are hoping to accomplish this goal by extending their territory through appropriation of adjacent maritime zones at great distances from their shores. Other developing countries call for limiting appropriation of this type while establishing an international authority to control the resulting public international domain of the deep seabed. This article begins with an analysis of the seabed mineral resources at stake. This is followed by a description of the various interest blocs, with emphasis on the United States and the developing countries. An examination of the environmental and economic impacts of seabed mining demonstrates the feasibility of a relatively independent international seabed resource authority. Basic policy choices in structuring that authority are then outlined. (Quarles-Florida)
W79-00608

FEDERAL RESERVATION OF GEOTHERMAL RESOURCES,
For primary bibliographic entry see Field 4B.
W79-00613

THE OTHER WATER POLLUTION (NONPOINT SOURCE POLLUTION),
For primary bibliographic entry see Field 5B.
W79-00614

A RIVER IN SPACE AND TIME,
B. Wirth.
Our Public Lands, Vol. 27, No. 3, p 5-8, Summer, 1977.

Descriptors: *Missouri River, *Montana, *Wild river act, *River regulation, Navigable waters, National parks, Recreation, Land management, Water management(Applied), Water resources, Wild rivers, Water conservation.

The preservation of the Missouri River became a reality in 1976 when that portion of the river known as the Missouri Breaks was added to the Nation's Wild and Scenic Rivers system. The section included runs from the Fred Robinson Bridge in the James Kipp State Park downstream for 149 miles to Fort Benton. This section remains free and unencumbered by development. The Missouri River has served as the main artery of the northern Great Plains and remains rich in history. This article traces the history of the river back through the days of the North American Plains Indians and the

Lewis and Clark expedition. The latter's exploits are recounted in some detail since their exploration established the Missouri as the major inland route for commerce and subsequent settlement of the West. The article discusses the process by which the river came to be included in the Wild and Scenic Rivers System. The National Park Service, the U.S. Army Corps of Engineers and the state of Montana all had a hand in the matter. The Bureau of Land Management must now develop a management plan for the area. (Quarles-Florida)
W79-00615

THE LAW OF THE SEA CONFERENCE AND ITS AFTERMATH,
In: Proceedings of the 71st Annual Meeting, American Society of International Law, April 21-23, 1977, San Francisco, California, Nafziger, J. A., ed., Lancaster Press, Lancaster, PA. 17604, p 107-28.

Descriptors: *Law of the sea, *United Nations, *Negotiations, *Conferences, Treaties, International law, Oceans, Internal water, Marine geology, Ownership of beds, International waters, Mining.

Deepsea mining issues constitute the largest set of unresolved issues before the Third United nations Law of the Sea Conference and remain the key to a comprehensive treaty. The Revised Single Negotiating Text proposed that the international Seabed Resources Authority grant mining rights to its own 'Enterprise', but that it must also grant rights to others on a nondiscriminatory basis. This idea was rejected as being too favorable to the United States. This article offers a panel discussion of the aftermath of the law of the Sea Conferene. Elliot Richardson, Chairman of the national Security Council Inter-Agency Task Force on the Law of the Sea, offers his observations of the conference and prognosticates a growing urgency among all participants to reach a settlement. J. Alan Beesley, Canada's Asst. Under-Secretary of State for External Affairs, discusses the implications of successes, failures and future prospects of the Conference and its diverse issues. Arvid pardo, University of Southern California, comments on two points that he felt received insufficient consideration at the Conference: (1) the principle ofthe seabed as the common heritage of mankind; and (2) the definition ofthe intentional seabed area.
W79-00616

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1977 (PART 2, DULUTH AND ALEXANDRIA, MINN.).
For primary bibliographic entry see Field 5G.
W79-00617

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1977 (PART 5, LEMARS, IOWA).
For primary bibliographic entry see Field 5G.
W79-00618

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1977 (PART 8, WASHINGTON, D.C.).
For primary bibliographic entry see Field 5G.
W79-00619

IOWA WATER QUALITY MANAGEMENT PLAN: DES MOINES RIVER BASIN,
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
For primary bibliographic entry see Field 5G.
W79-00645

IOWA WATER QUALITY MANAGEMENT PLAN: SUPPORTING DOCUMENT,
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
For primary bibliographic entry see Field 5G.
W79-00646

IOWA WATER QUALITY MANAGEMENT PLAN: NORTHEASTERN IOWA BASIN.
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
For primary bibliographic entry see Field 5G.
W79-00647

IOWA WATER QUALITY MANAGEMENT PLAN: WESTERN IOWA BASIN.
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
For primary bibliographic entry see Field 5G.
W79-00648

IOWA WATER QUALITY MANAGEMENT PLAN: SKUNK RIVER BASIN.
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
For primary bibliographic entry see Field 5G.
W79-00649

IOWA WATER QUALITY MANAGEMENT PLAN: SOUTHERN IOWA BASIN.
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
For primary bibliographic entry see Field 5G.
W79-00650

IOWA WATER QUALITY MANAGEMENT PLAN: IOWA-CEDAR RIVER BASIN.
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
For primary bibliographic entry see Field 5G.
W79-00651

DRAFT ENVIRONMENTAL IMPACT STATEMENT, NORTH FULTON COUNTY AND NORTHEAST COBB COUNTY, GEORGIA.
Environmental Protection Agency, Atlanta, GA. Region IV.
For primary bibliographic entry see Field 6G.
W79-00653

UTAH LAKE-JORDAN RIVER HYDROLOGIC BASINS WATER QUALITY MANAGEMENT STUDY. VOLUME I.
Templeton, Linke and Alsup, Salt Lake City, UT.; and Engineering Science, Inc., Berkeley, CA.
For primary bibliographic entry see Field 5G.
W79-00660

THE NATIONAL ENVIRONMENTAL POLICY ACT AND FEDERAL WATER RESOURCES PLANNING: EFFECTS AND EFFECTIVENESS IN THE CORPS AND SCS,
Stanford Univ., CA. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W79-00665

CAPE COD WATER QUALITY MANAGEMENT PLAN.
Massachusetts Water Resources Commission, Westborough. Water Quality Section.
For primary bibliographic entry see Field 5G.
W79-00666

BUREAUCRATS VS. VOTERS: ON THE POLITICAL ECONOMY OF RESOURCE ALLOCATION BY DIRECT DEMOCRACY,
Carnegie-Mellon Univ., Pittsburgh, PA. Graduate School of Industrial Administration.
T. Romer, and H. Rosenthal.
Work Paper No. 9, July 1977. 44 p 4 fig, 2 tab, 18 ref.

Descriptors: *Economics, *Voting, *Political aspects, Referenda, *Mathematical models, *Expenditures, *Administrative agencies, *Financing, *Bond issues, Democracy, Budgets, Model studies, Monopoly, Competition, Agendas, Oregon, Reversion point, Certainty, Uncertainty, Elections, Governments, Institutional constraints, Bureaucracy.

A model of 'direct democracy referendum voting patterns for public expenditures--tested with data from five years of public responses to school tax levy attempts in Portland, oregon--suggests two significant policy strategies for public agencies obliged to raise revenues through such unpredictable sources: (1) The probability of passage of any revenue-raising proposal increases each time the same proposal is put before the voters. (2) A small percentage should be cut from the preceding proposal each successive time it is re-issued. The monopoly model tested here assumes bureaus are expenditure maximizers, and that voters allow the bureaucracy to control the agenda; they respond as price-takers to the supply offer. On a given ballot voters have only a choice between and institutionally defined reversion expenditure andthe proposal offered by the bureau (or proposal setter). When the bureau has complete information about preferences and turnout the expenditure level depends critically on the reversion point; actual expenditures will be at least the level preferred by the median voter and never less. In the model, uncertainty is introduced as random voter turnout. For high reversion points as risk-neutral agenda setter will obtain a higher budget than with certainty, but for low reversion points uncertainty generally works against the setter. (Lynch-Wisconsin)
W79-00793

THE PROBLEM OF WATER,
Weizmann Inst. of Science, Rehovoth (Israel).
For primary bibliographic entry see Field 3B.
W79-00795

LAND TENURE AND DESERTIFICATION IN AUSTRALIA'S ARID LANDS,
R. W. Condon.
SEARCH, Vol. 9, No. 7, p 261-264, July 1978. 1 tab, 6 ref.

Descriptors: *Land tenure, *Australia, *Arid lands, Land use, Land management, Economic feasibility, Economic justification, Land reclamation, Droughts.

Utilization of Australia's arid lands which cover 5.7 million sq. km. or 74% of the country's total land area, has been governed by a land tenure system which has undergone considerable evolutionary change since settlement first began in the 1840's. Taking a slightly different direction in each of the states and territories, the land tenure system evolved from the system that was used in Great Britain. Formal settlement began after an initial period in which squatters fanned out over the country seeking the most favorable land. These first settlers with an over optimistic estimation of carrying capacity, caused severe degeneration and erosion of the land until economic depressions, prolonged droughts, and rabbit plagues began to cause disastrous situations. There have been two periods, one in 1901-02, the other from 1920-1940, in which severe drought and economic depression coincided with a burst of new settlement. Severe deterioration of land productivity particularly in arid western New South Wales, resulted. Since the middle of this century however an increasing awareness of the destructive processes has been coupled with a completely new set of more favorable circumstances. These circumstances include: (1) more favorable rainfall, (2) disappearance of the rabbit, (3) progressive breakdown in the size of

large properties into one-man family holdings with better water supplies and fencing, and (4) easier movement of livestock out of drought-affected areas. These factors along with a greater awareness of the desertification processes by the farmer, have contributed to a reversal of the earlier degenerative conditions. (Tickes-Arizona)
W79-00811

STRATEGY FOR THE DEVELOPMENT AND MANAGEMENT OF DESERTS.
For primary bibliographic entry see Field 4A.
W79-00818

USER'S MANUAL FOR PREMINING PLANNING OF EASTERN SURFACE COAL MINING, VOLUME I: EXECUTIVE SUMMARY,
Pennsylvania State Univ., University Park. Dept. of Mineral Engineering.
For primary bibliographic entry see Field 5G.
W79-00877

MISSISSIPPI WETLANDS PROTECTION PRACTICE AND PROCEDURE.
Mississippi Univ. Law Center, University.
Mississippi/Alabama Sea Grant Consortium Report No. MASGP-78-013, 1977. 56 p. SG-04-7-158-44017.

Descriptors: *Wetlands, *Mississippi, *Legislation, Shore protection, Ecosystems, Estuarine environment, Coastal zone management.

A survey of wetlands protection in Mississippi was made by examination of: (1) the importance of wetlands in the estuarine ecosystem; (2) analysis of Mississippi's wetlands protection, the stature and regulatory procedures; and (3) comparison of the Mississippi statute with those of Georgia, Alabama and North Carolina. (NOAA)
W79-00927

OIL POLLUTION CONTROL MECHANISMS - STATUTES AND REGULATIONS.
Mississippi Univ. Law Center, University.
For primary bibliographic entry see Field 5G.
W79-00928

6F. Nonstructural Alternatives

STATE AND FEDERAL REGULATION OF THE FLOOD PLAIN,
For primary bibliographic entry see Field 6E.
W79-00600

FLOOD PLAIN INFORMATION: OGDEN RIVER, OGDEN, UTAH.
Army Engineer District, Sacramento, CA.
For primary bibliographic entry see Field 4A.
W79-00669

FLOOD PLAIN INFORMATION: BOX ELDER CREEK, BRIGHAM CITY, UTAH.
Army Engineer District, Sacramento, CA.
For primary bibliographic entry see Field 4A.
W79-00670

FLOOD PLAIN INFORMATION: WOLF CREEK, LAWTON, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00671

FLOOD PLAIN INFORMATION: CHIKASKIA RIVER, BLACKWELL, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00672

FLOOD PLAIN INFORMATION: PROVO RIVER AND ROCK CANYON CREEK, PROVO-OREM, UTAH.
Army Engineer District, Sacramento, CA.
For primary bibliographic entry see Field 4A.
W79-00673

FLOOD PLAIN INFORMATION: COODY CREEK, MUSKOGEE, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00674

FLOOD PLAIN INFORMATION: HAIKEY CREEK, TULSA COUNTY, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00675

FLOOD PLAIN INFORMATION: PRYOR CREEK AND SALT BRANCH, PRYOR CREEK, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00676

FLOOD PLAIN INFORMATION: STILLWATER CREEK AND TRIBUTARIES, STILLWATER, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00677

6G. Ecologic Impact Of Water Development

AN AERIAL SURVEY OF WATERBIRD COLONIES ALONG THE UPPER MISSISSIPPI RIVER AND THEIR RELATIONSHIP TO DREDGED MATERIAL DEPOSITS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
D. H. Thompson, and M. C. Landin.
Technical Report D-78-13, April 1978. 103 p, 10 tab, 96 ref, 2 append.

Descriptors: *Birds, *Water birds, *Waterfowl, *Mississippi River, *Habitats, *Dredged material, *Waste disposal sites, *Aerial surveys.

Aerial surveys of 1040 km of the Upper Mississippi River, Locks and Dams 1-26, showed 35 active colonies of five species of larger waterbirds (great blue heron, great egret, black-crowned night heron, double-crested cormorant, and Forster's tern) nesting in the floodplanin. In addition, green herons and yellow-crowned night herons are reported as nesting, although location by aerial survey was not possible due to cryptic coloration and nest placement beneath the tree canopy. No species were found nesting on dredged material. In general, colonies were located on isolated insular natural sites on the east side of the river below dams and/or tributaries. Dredged material sites were found to be unsuitable for nesting because of high human recreational use of dredged material and the early succession of vegetation stages present.
W79-00542

COLONIAL BIRD USE AND PLANT SUCCESSION ON DREDGED MATERIAL ISLANDS IN FLORIDA; VOL. I: SEA AND WADING BIRD COLONIES,
Seabird Research Inc., Culver City, CA.
R. W. Schreiber, and E. A. Schreiber.
Available from National Technical Information Service, Springfield, VA 22161 as AD-A056 086, Price codes: A03 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Miss., Technical Report D-78-14, April 1978 (In 2 volumes). 127 p, 21 fig, 10 tab, 65 ref, 2 append.

Descriptors: *Birds, *Shore birds, *Habitats, *Plant populations, *Florida, *Islands, *Succession, Waterfowl, Water birds, *Dredged material.

Bird use of dredged material islands in five areas of Florida was studied. The use of these islands by birds, particularly by colonial nesting sea and wading birds, was documented with two visits to each of 40 selected islands in five study areas in 1977. The islands were used as nesting habitat by 26 species of colonial and 8 species of noncolonial birds. The islands were also used extensively for feeding, loafing, and roosting by these and other species. Various species-habitat interactions and the significance of dredged material islands to colonial nesting sea and wading birds are discussed in detail.
W79-00543

COLONIAL BIRD USE AND PLANT SUCCESSION ON DREDGED MATERIAL ISLANDS IN FLORIDA; VOL. II: PATTERNS OF PLANT SUCCESSION,
Seabird Research Inc., Culver City, CA.
R. R. Lewis, III, and C. S. Lewis.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A056 803, Price codes: A06 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-78-14, April 1978 (In 2 volumes). 175 p, 75 fig, 44 tab, 36 ref.

Descriptors: *Birds, *Shore birds, *Plant populations, *Habitats, *Florida, Islands, *Succession, *Dredged material.

This study was made to determine succession of vegetation on various aged dredged material islands in Florida. Forty islands in five selected study areas were intensively examined. An extensive literature review was conducted. Vertical aerial photographs and vegetation maps of each island are presented. A total of 141 plant species were found to occur on the islands. In Florida, typical island vegetation occurred through colonization by propagules from water-, wind-, and bird-carried sources. Marsh grasses such as smooth cordgrass preceded establishment by upland species such as Brazilian pepper, Australian pine, sabal palm, and herbaceous and grass cover. Bird use of the islands was directly related to the stage of plant succession, and bird fecal material was found to affect the vegetation both adversely and beneficially depending upon location. Recommendations for management include creation of new islands and enlargement and stabilization of existing eroding islands for bird use. Maintenance of unvegetated sites as critical habitat for terns and black skimmers is also recommended. (See also W79-00543) (WES)
W79-00544

AN ASSESSMENT OF THE POTENTIAL IMPACT OF DREDGED MATERIAL DISPOSAL IN THE OPEN OCEAN,
Terco Corp., College Station, TX.
For primary bibliographic entry see Field 5C.
W79-00549

ENVIRONMENTAL QUALITY EXPENDITURE PATTERNS AND URBAN LOCATION: EFFECTS ON INCOME GROUPS,
Ottawa Univ. (Ontario), Dept. of Geography and Regional Planning.
P. F. Ricci, L. E. Perron, and B. A. Emmett.
Socio-Economic Planning Sciences, Vol. 11, No. 5, 1977, p 249-258. 4 fig, 4 tab, 27 ref.

Descriptors: *Environmental economics, *Social values, *Canada, *Cities, *Income distribution,

*Expenditures, Montreal(Canada), Locating, Economics, Social aspects, Pollutants, Pollution abatement, Econometrics, Motivation, Value, Income, Equity, Planning, Decision making.

Consumption patterns by residents of 11 major Canadian metropolitan areas for pollution-intensive goods and services were investigated, along with the relationship between median income and proxies for urban environmental quality in choice of location by Montreal residents. Conclusions: (1) In the metrolpolitan areas studied (1969) the wealthy consumed somewhat more pollution-intensive goods and services than the poor; (2) The wealthy consumed considerably more than the poor of certain items such as gasoline for automobile and air travel; (3) the economic costs of environmental regulation tend to fall more heavily on the poor, though economic theory suggests that the poor value increments of environmental quality relatively less than the rich; and (4) Montreal residents tend to spend their money on home and neighborhood improvements rather than seek locations with higher environmental quality and lower population density. Montreal residents were found to be affected by the urban environment in quantifiable ways which can be used in environmental policy-making and management. Despite the findings, it is not argued that pollution control should be abandoned because of risks of worsening existing income distribution inequities, nor is it proposed that environmental management be used in an effort to redistribute income. (Lynch-Wisconsin)
W79-00586

THE CONTINUING PROBLEM OF NON-NATIVE FISHES IN FLORIDA,
For primary bibliographic entry see Field 5G.
W79-00591

IOWA WATER QUALITY MANAGEMENT PLAN: DES MOINES RIVER BASIN,
Iowa Dept. of Environmental Quality, Des Moines. Water Quality Management Div.
For primary bibliographic entry see Field 5G.
W79-00645

ENVIRONMENTAL IMPACT COMPUTER SYSTEM ATTRIBUTE DESCRIPTOR PACKAGE, REFERENCE DOCUMENT.
Construction Engineering Research Lab., Champaign, IL.
For primary bibliographic entry see Field 7A.
W79-00652

DRAFT ENVIRONMENTAL IMPACT STATEMENT, NORTH FULTON COUNTY AND NORTHEAST COBB COUNTY, GEORGIA.
Environmental Protection Agency, Atlanta, GA. Region IV.
North Fulton County, GA WPC-GA 189. Northeast Cobb County, GA WPC-GA 173. July 6, 1973, 74 p, 5 fig, 5 tab, append.

Descriptors: *Water quality, *Land use, *Drainage basins, *Urban runoff, Waste water treatment, *Georgia, Water supply, Sewage treatment, Governments, Computer programs, Fulton County(GA), Cobb County(GA), *Environmental effects, Chattahoochee River(GA), Environmental Impact Statements, Sewer lines, Interceptors, Buffer zones.

This draft EIS addresses a proposed plan for providing collection and treatment of domestic sewage in parts of North Fulton County and Northeast Cobb County, GA and possible alternatives to that plan. It covers projects which are proposed for additional sewering of the approximate middle third of North Fulton County, a contiguous area in Cobb County, and sewers for areas south of the Chattahoochee River. Background information is provided on drainage basins, a general description of the area, existing water supply and sewerage facilities, population projections, and governmental activities. The primary beneficial effect of the proposed projects is the enhancement of public health and welfare. Modern wastewater collection and treatment techniques will protect the Chattahoochee River from wastewater discharges. This river is used as a water supply and recreation facility and the proposed treatment facilities will meet the standards for water quality under the FWPCA. The primary adverse effect of the proposed projects is the stimulation of secondary effects caused by urban development, such as urban runoff, soil erosion, and reduction of the aesthetic values. Other adverse effects would result from the actual construction of the facilities, including removal of vegetation and short-term erosion and siltation. The appendix provides a simplified FORTRAN program for developing a rudimentary method for calculating contaminant concentrations and flood water quantities for specific rainfall events. (Coan-NC)
W79-00653

PROCEEDINGS OF THE FIRST US/USSR SYMPOSIUM ON COMPREHENSIVE ANALYSIS OF THE ENVIRONMENT.
Environmental Protection Agency, Washington, DC. Office of Research and Development.
For Sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402 and Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 600, Price codes: A09 in paper copy, A01 in microfiche. Report EPA-600/9-75-004, March 25-329, 1974, 196 p.

Descriptors: *Economics, *Systems analysis, *Biochemical oxygen demand, *Ecology, Mathematical models, Chemicals, Pollution, Environmental control, Air quality, Air pollution, *Bioclimatology, *Environmental management, *Environmental analysis, USSR, Biosphere, Human stress, Maximum permissible load, Modelling, Environmental surveys, Environmental pollution.

These proceedings include the 24 papers presented at the first US/USSR symposium on environmental matters. The papers presented were grouped into the following categories: theme-analysis to support environmental management; comprehensive modelling; maximum permissible loading; economic criteria for establishing environmental quality goals; implementation strategies for achieving and maintaining environmental standards; impact of pollution and environmental conditions on non-human species; and pollution impacts on climate. The purpose of the symposium was to consider comprehensively the entire complex interacting environmental system within the context of certain socio-economic constraints. Questions of social risk, maximum permissible environmental stress necessary to protect public health, cost of control plans, and other points were raised during the symposium and treated at length in the proceedings' papers. The participants are from environmental and economic disciplines from both universities and governmental agencies in the US and USSR. (Coan-NC)
W79-00654

STATE OF NORTH CAROLINA COASTAL MANAGEMENT PROGRAM AND DRAFT ENVIRONMENTAL IMPACT STATEMENT.
National Oceanic and Atmospheric Administration, Washington, DC. Office of Coastal Zone Management.
Also prepared by the N. C. Coastal Management Program, N.C. Department of Natural Resources and Community Development, Raleigh, 1978, 266 p.

Descriptors: *Coasts, *Planning, *Management, *Land use, *Coastal areas, *Coastal plains, Legal aspects, Regulation, Permits, Decision making, Legislation, Coordination, Administration, Conservation, Preservation, State jurisdiction, Local governments, Governmental interrelations, *Environmental Impact statement, *Coastal planning, *Areas of Environmental Concern, *North Carolina, *Coastal Zone Management Act, Implemenation, Enforcement, Development.

This volume is one of two, and contains the draft environmetal impact statement (DEIS) and program document for possible approval of the North Carolina Coastal Plan under the Federal Coastal Zone Management Act. Volume II contains the appendices to the program document. Part I of this volume is a summary of the N. C. Coastal Management Program; Part II is a description of the Program; and Part III fulfills the NEPA requirements for a DEIS. The North Carolina Coastal Managment Program proposes a cooperative state-local effort to protect and insure the orderly development of the coastal zone. The three mechanisms utilized to implement the program include local land use planning, State designation of areas of environmental concern (AECs), and shared state-local authority for regulating developent within AECs. Local land use plans are required and have been developed and approved according to State guidance for all coastal counties and municipalities. These land use plans will serve as one criterion for evaluating permit applications for development in AECs. AECs have been designated in order to protect the coastal area from either excessive or poorly designed development. Developemnt within a AEC requires a permit. The Coastal Resources Commission (CRC) issues major permits, and local permit officers issue minor permits. The Impact Statement identifies three potential problems with the coastal management program--the geographic extent of AECs may be insufficient; the State may not be able to insure State agency compliance with coastal policies in areas outside of AECs; and local governments may not be obligated to enforce the State-approved local land use plans. (See also W79-00659).
W79-00658

THE NATIONAL ENVIRONMENTAL POLICY ACT AND FEDERAL WATER RESOURCES PLANNING: EFFECTS AND EFFECTIVENESS IN THE CORPS AND SCS,
Stanford Univ., CA. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5G.
W79-00665

COLONIAL BIRDS NESTING ON MAN-MADE AND NATURAL SITES IN THE U.S. GREAT LAKES,
Northwestern Michigan Coll., Traverse City.
For primary bibliographic entry see Field 2H.
W79-00765

STRATEGY FOR THE DEVELOPMENT AND MANAGEMENT OF DESERTS.
For primary bibliographic entry see Field 4A.
W79-00818

DESERTIFICATION OF AUSTRALIA IN ITS GLOBAL CONTEXT,
New South Wales Univ., Kensington.
J. A. Mabbutt.
SEARCH, Vol. 9, No. 7, p 252-256, July 1978. 1 tab, 7 ref.

Descriptors: *Desertification, *Australia, *Deserts, *Arid lands, *Land use, Droughts, Environmental effects, Land management, Land resources, Range management, Productivity, Dry farming, Drainage, Waterlogging, Salinity, Saline water intrusions, Irrigated land, Social aspects.

Since the Sahelian drought (1968-1974) the processes of desertification have been receiving

international attention, culminating with the U.N. conference on desertification in Nairobi (1977). The most important manifestations of desertification are analyzed here as the author attempts to put Australian arid region problems in a global context. Desertification, present to varying degrees throughout the world, is by no means restricted to arid regions. Deserts are not necessarily spread from a core outward but can advance by accretion as the state of a once productive area is reduced. Desertification has variable causes and effects in different agricultural or non-agricultural regions. Depending upon the type of land use, the process may be characterized by a deterioration of rangelands, falling yields and loss of productive dryland farming regions, waterlogging and salination of irrigated lands or unrevegetated mine fields. Human settlements have likewise had an impact upon sensitive arid regions not only by the mere increase of human activity but also through the distinctive regional character created by the inhabitants. (Tickes-Arizona)
W79-00819

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF: PROGRAM WORK STATEMENTS FISCAL YEAR 1978, VOLUME I.
National Oceanic and Atmospheric Aministration, Boulder, CO. Environmental Research Labs.
Outer Continental Shelf Environmental Assessment Program, Work Statements, June 1978. 754 p.

Descriptors: *Baseline studies, *Environmental effects, *Alaska, Aquatic life, Birds, Biota, Fish, Geology, Hazards, Ice, Pollutants, Cold regions, *Outer Continental Shelf.

In this compilation statements of work in progress or in plan for the surveys of aquatic life or non-living resources likely to be involved in one way or another by resources development on the Alaskan Continental Shelf are given. These baseline studies deal with the specific life forms, geology, ice transport, hazards and ecology in this cold region. (NOAA)
W79-00895

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF: PROGRAM WORK STATEMENTS FISCAL YEAR 1978, VOLUME II.
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
Outer Continental Shelf Environmental Assessment Program, Work Statements, June 1978. 652 p.

Descriptors: *Baseline studies, *Alaska, *Resources development, Permafrost, Remote sensing, Mammals, Sea ice, Aquatic life, Water resources, Geological surveys, Geophysics, Pathology, Cold regions, *Outer Continental Shelf, Beaufort Sea, Bering Sea, Gulf of Alaska.

In this compilation statements of work in progress or in plan for the surveys of aquatic life or non-living resources likely to be involved in one way or another by resources development on the Alaskan Continental Shelf are given. These baseline studies deal with the specific life forms, geology, ice transport, hazards and ecology in this cold region. (NOAA)
W79-00896

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF: PROGRAM WORK STATEMENTS FISCAL YEAR 1978, VOLUME III.
National Oceanic and Atmospheric Administration, Boulder, CO. Environmental Research Labs.
Outer Continental Shelf Environmental Assessment Program Work Statements, June 1978. 846 p.

Descriptors: *Baseline studies, *Environmental effects, *Resources development, *Alaska, Geological surveys, Hazards, Transport, Aquatic life, Water pollution, Oil pollution, Cold regions, *Outer Continental Shelf, Bering Sea, Beaufort Sea, Gulf of Alaska, Petroleum, Chemical pollutants, Hydrocarbons.

In this compilation statements of work in progress or in plan for the surveys of aquatic life or non-living resources likely to be involved in one way or another by resources development on the Alaskan Continental Shelf are given. These baseline studies deal with the specific life forms, geology, ice transport, hazards and ecology in this cold region. (NOAA)
W79-00897

HABITAT STRUCTURE AND STREAM FISH COMMUNITIES,
Purdue Univ., Lafayette, IN. Dept. of Biological Sciences.
For primary bibliographic entry see Field 2I.
W79-00940

TAMANO OIL SPILL IN CASCO BAY: ENVIRONMENTAL EFFECTS AND CLEANUP OPERATIONS.
Environmental Protection Agency. Washington, DC. Spill Prevention and Control Board.
For primary bibliographic entry see Field 5G.
W79-00983

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME I.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Quarter October -December 1977, Environmental Assessment of the Alaskan Continental Shelf, March 1978. 511 p.

Descriptors: *Alaska, *Aquatic life, *Water pollution effects, *Baseline studies, Resources development, Oil pollution, Aquatic microbiology, Environmental effects, Pollutants, Biota, *Outer Contiental Shelf, Petroleum development.

Reports containing baseline studies are compiled in this quarterly report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from petroleum resources development and transport on the outer continental shelf of Alaska. The reports are grouped in the following categories: Receptors (Biota)--marine mammals, marine birds, marine fish and microbiology; Contaminant Baselines; and Effects. (See also W79-00999) (NOAA)
W79-00998

ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. VOLUME II.
National Oceanic and Atmospheric Administration, Boulder, CO. Outer Continental Shelf Environmental Assessment Program.
Principal Investigators' Reports for the Quarter October - December 1977, Environmental Assessment of the Alaskan Continental Shelf, March 1978. 606 p.

Descriptors: *Alaska, *Water pollution sources, *Baseline studies, Resources development, Environmental effects, Hazards, Transport, Data processing, *Outer Continental Shelf, Petroleum development.

Reports containing baseline studies are compiled in this quarterly report. They are intended to serve as markers or as points of departure from which to assess the potential environmental impact that might result from petroleum resources development and transport on the outer continental shelf of Alaska. The reports are grouped in the following categories: Transport, hazards and data management. (See also W79-00998) (NOAA)
W79-00999

7. RESOURCES DATA

7A. Network Design

PROBLEM-RESEARCH ANALYSIS IN THE U.S. VIRGIN ISLANDS INSULAR REGION, ATLANTIC SUBREGION,
College of the Virgin Island, St. Thomas. Caribbean Research Inst.
For primary bibliographic entry see Field 6B.
W79-00511

ON THE DESIGN OF HYDROLOGIC DATA NETWORKS,
Geological Survey, Reston, VA. Water Resources Div.; and Washington, Univ., Seattle; and Princeton Univ., NJ.
M. E. Moss, D. P. Lettenmaier, and E. F. Wood.
EOS Transactions, American Geophysical Union, Vol 59, No 8, p 772-775, August 1978. 8 ref.

Descriptors: *Network design, *Hydrologic data, *Data collections, *Design criteria, *Hydrologic structures, Engineering structures, Evaluation.

The organized collection of hydrologic data has been a steadily increasing activity in the United States since 1889, when the first stream-gaging station was established on the Rio Grande at Embudo, New Mexico. The hydrologic data network is the main link between the hydrologic phenomena and water resources engineering, for it is the primary conveyer of hydrologic information. Thus the design of the network should encompass both hydrology and engineering; that is, the design technique should account for the nature of the phenomena and for the uses that will be made of the data. (Woodard-USGS)
W79-00636

ENVIRONMENTAL IMPACT COMPUTER SYSTEM ATTRIBUTE DESCRIPTOR PACKAGE, REFERENCE DOCUMENT.
Construction Engineering Research Lab., Champaign, IL.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A024 303, Price codes: A99 in paper copy, A01 in microfiche. Technical Report E-86, April 1976, 769 p. 4A1621A-896-01-001.

Descriptors: *Environmental effects, *Ecology, *Groundwater, *Surface waters, *Economics, *Land use, *Transportation, *Aesthetics, *Computer program, Energy, Water resources, *Environmental Impact Statements, *Environmental Assessments, Air quality, Health sciences, Sociology, Earth science, Noise, Environmental attributes, Resource conservation, Energy conservation, U.S. Army.

The report's objective is to explain to the user of the Environmental Impact Computer System (EISC)--prepared for the U.S. Army--the meaning of those environmental attributes which are designated as 'impacted' in the project-related matrices for projects requiring preparation of Environmental Assessments and Environmental Impact Statements. The report explains why descriptor packages and paragraphs were developed, how to use them, and how they might help the user prepare Environmental Impact Statements and Assessments for their projects and programs in a more economical and efficient fashion. Explanations are given of the purpose, philosophy and methodology of the attribute descriptor packages and paragraphs. Three levels of environmental at-

tributes are described--detailed level attributes, review level attributes, and controversial attributes. The parts of the descriptor packages are explained along with instructions for using them to facilitate impact analyses. Finally, the report provides the user with a copy of all the descriptor packages and paragraphs developed to the time of printing. Environmental attributes are defined as *those variables representing environmental* characteristics. Changes in these variables are seen to provide indicators of change in the environment. Those attributes perceived as redundant, difficult to measure or obscure were eliminated. The three levels of attributes mentioned above were developed for each of the 12 specialty areas of ecology, health science, air quality, surface waters, ground waters, sociology, economics, land use, earth science (energy and resource conservation), noise, transportation and aesthetics. (Zayac-NC)
W79-00652

7B. Data Acquisition

A EXPERIENCE IN DECIPHERING SPACE PHOTOGRAPHS AND TELEVISION IMAGES OF THE USTYURT PLATEAU FOR HYDROLOGICAL PURPOSES (IN RUSSIAN),
V. V. Aristova, S. V. Viktorov, M. A. Danilova, A. L. Sadov, and N. S. Semina.
Probl Osvo Pustyn (1), p 15-28, 1977.

Descriptors: *Remote sensing, Geology, Kazakh-SSR, Meteorlogic data, Nimbus, Satellites(Artificial), Soyuz, USSR, *Grondwater sources, Aerial photography.

A review is given of data received on the general regional conditions of underground water formation in the Ustyurt Plateau (Kazakh SSR, USSR) by means of photography and television images from the satellites Soyuz 6 and 9 and the American Meteor and nimbus systems. The hydrogeological interpretation of space photographs depends on structural-geomorphological and landscape decephering and demands a thorough analysis of data from regional underground studies. Application of the greatly generalized and small-scale televison pictures helps to establish the general regional hydrogeological regularities and focus on the conditions of formation and discharge of ground and presdsurized water for hydrological regionalization of the territory. Analysis of separate small scale space photographs from the Soyuz 9 confirms their high informativeness and applicability in comparison to television photos for resolution of the given problems.--Copyright 1978, Biological Abstracts, Inc.
W79-00609

RECORDING WIRE STRAINMETERS ON THE BARNES ICE CAP, BAFFIN ISLAND, CANADA,
Cambridge Univ. (England). Dept. of Geodesy and Geophysics.
For primary bibliographic entry see Field 2C.
W79-00696

AN INVESTIGATION INTO THE USE OF STRAIN ROSETTES FOR THE MEASUREMENT OF PROPAGATING CYCLIC STRAINS,
Scott Polar Research Inst., Cambridge (England).
For primary bibliographic entry see Field 2C.
W79-00697

A MECHANICAL TEST PROCEDURE FOR AVALANCHE SNOW,
Beck (R. W.) and Associates, Denver, CO.
For primary bibliographic entry see Field 2C.
W79-00698

ANCESTRAL NIAGARA RIVER DRAINAGE: STRATIGRAPHIC AND PALEONTOLOGIC SETTING,
State University of New York at Buffalo. Dept. of Geological Sciences.
For primary bibliographic entry see Field 4A.
W79-00703

AN INTEGRATED STUDY OF EARTH RESOURCES IN THE STATE OF CALIFORNIA USING REMOTE SENSING TECHNIQUES.
California Univ., Berkeley. Space Sciences Lab.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-10551, Price codes: A99 in paper copy, A01 in microfiche. Annual Progress Report, Series 16, Issue 34, May 1, 1975. 632 p. NASA NGL 05-003-404.

Descriptors: *Remote sensing, *Water resources, *California, Satellites(Artificial), Water supply, Water demand, Social impact, Costs, Forests, Vegetation, Data processing, Snow cover, Model studies, Snow, Mathematical models, Watersheds(Basins), Mapping, *LANDSAT.

For a good many reasons, the State of California continues to constitute an unusually favorable test site within which to conduct an integrated study of earth resources based on remote sensing techniques. The findings from this research are proving to be of great significance, both as an aid to the management of California's earth resources and also as a means for making similar remote sensing-based inventories to uniform standards on a global basis. Research efforts under this integrated multi-campus study continue to be directed primarily toward developing remote sensing techniques for the inventory and management of California's water resources. (Sims-ISWS)
W79-00711

U.S. ARMY CORPS OF ENGINEERS FIFTH HYDROGRAPHIC SURVEY CONFERENCE.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
Conference held at Norfolk, Virginia, 8-9 November 1977. Hart, E. D. and Downing, G. C., eds. March 1978. 102 p, 5 append.

Descriptors: *Surveys, *Surveying instruments, *Hydrography, *Sounding, *Bathymetry, *Hydrographic surveys.

Consists primarily of proceedings from a conference on hydrographic surveying. Paper included discuss two new surveying systems, system mobility and data processing. 'Trailerable Automated Survey Boat,' by Donald Thrower, describes tests using a small boat data logger device. Several portable data collection systems are examined, especially in regard to track loss performance. 'Demonstration of Passive Reflector Navigation System for Dredging and Buoy Tending Operations,' by G. C. Downing, describes an evaluation study directed toward improving the techniques available for positioning marine vessels such as dredges. The passive reflector positioning system (PRANS) is discussed and its potential as a lower operating cost alternative to existing techniques is examined. 'Bathymetric Swath Survey System and Its Potential for Effective Bottom Mapping,' by W. T. Mobley, discusses the Bathymetric Swath Survey System (BS3) program in regard to the effectiveness of marine surveying, data quality, and techniques for acquiring and processing bathymetric data. 'Automated Survey System -- Data Processing,' by O. J. McCoy, describes the use of automated survey systems and methods of integrating the acquisition and processing data in such systems. Field system hardware and software capabilities are examined. (WES)
W79-00766

THE UNITED KINGDOM MARKET FOR AIR AND WATER PURIFICATION AND POLLUTION CONTROL EQUIPMENT,
Planning Research and Systems, Ltd., London (England).
For primary bibliographic entry see Field 5G.
W79-00790

WATER LEVEL MEASUREMENT DEVICE,
For primary bibliographic entry see Field 4A.
W79-00822

COMBINED HOUSING AND STANDARD FOR WATER FLOW METERS,
S. J. Niskin.
U.S. Patent No. 4,091,666, 6 p, 8 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 970, No 5, p 1667-1668, May 30, 1978.

Descriptors: *Patents, *Currents(Water), Current meters, Flow, Velocity, Measurement, Equipment.

The invention provides for cylindrical housings for current meters with a means for preventing the housing from being eratic in movement so that the true readings of current velocity and direction are attained. The cylindrical housing has a pair of flexible fins that lie in planes that intersect at right angles to each other at the axis of the housing. The fins increase the range of current velocity readings. The housing contains instruments for determining current velocity and direction in a body of water and has a standard connected to a vertical cable anchored at one end and has a float at the other end to prevent the housing from bobbing up and down with the wave action of the body of water. (Sinha-OEIS)
W79-00827

WATER SAMPLE COLLECTING DEVICE,
S. J. Niskin.
U.S. Patent No. 4,091,676, 10 p, 27 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 970, No 5, p 1671, May 30, 1978.

Descriptors: *Patents, *Sampling, *Water sampling, Valves, Equipment.

A water sample collecting device for obtaining a sample of water at a predetermined depth consists of a tubular member with spherical valves at both ends. The valves are maintained in a closed position when launches and opened after the device is descending in the water to permit flushing of the device. When the device has reached the desired depth a messenger causes the valves to rotate to the closed position at which time the sample of water is brought to the surface. (Sinha-OEIS)
W79-00828

LABORATORY AND FIELD MEASUREMENTS OF UPWELLED RADIANCE AND REFLECTANCE SPECTRA OF SUSPENDED JAMES RIVER SEDIMENTS NEAR HOPEWELL, VIRGINIA,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5B.
W79-00881

A PLANKTON NET DESIGNED TO EXCLUDE AIR-SEA INTERFACE PHENOMENA,
Washington Univ., Seattle. Dept. of Oceanography.
J. R. Clayton, and S. P. Pavlou.
Bulletin of Environmental Contamination and Toxicology, Vol. 20, p 369-377, 1978. 3 fig, 3 tab, 19 ref.

Descriptors: *Sampling, *Plankton, *Research equipment, Equipment, Nets, Plankton, Water analysis, Chemical analysis, Monitoring, Trophic

level, Zooplankton, Chlorinated Hydrocarbon pesticides, DDT, Polychlorinated biphenyls, Chromatography, Analytical techniques.

A description is presented of a protected closed plankton net whose purpose is to minimize the exposure of collected samples to surface films and debris. Tests described in this paper appeared to show that the protected closed net was not necessary for the environmental conditions encountered during our field studies. However, additional calculations based on the data of other investigators strongly imply that employment of such a net in heavily polluted surface waters may be highly advantageous for use in trace pollutant studies. (EIS-Deal)
W79-00943

A VERSATILE PUMP-SAMPLER FOR LIVE ZOOPLANKTON,
Central Electricity Generating Board, Southampton (England). Marine Lab.
J. Coughlin, and J. M. Fleming.
Estuaries, Vol. 1, No. 2, p 132-135, 1978. 2 fig, 1 tab, 10 ref.

Descriptors: *Sampling, *Pumps, *Zooplankton, *Thermal powerplants, *Entrainment, Data collections, On-site data collections, Reliability, Plankton, Steam turbines, Powerplants, Closed conduit flow, Pipe flow, Filters, Intakes, Outlets, Cooling water.

The sampler consists of a readily interchangeable nylon-mesh sleeve mounted on the suction of a submersible pump. The unit is compact and robust, with the mesh totally protected form external damage. Although designed primarily for use in the intakes and outfalls of power stations, this sampler and the variants described could find more general application. The incorporation of a submersible pump circumvents both the suction lift restriction and the problems associated with plankton travel through long lengths of hose that are inherent in previous designs. Less than 3% of the members of estuaries/inshore zooplankton so collected showed damage or had died within 48 hours of capture. (EIS-Deal)
W79-00949

7C. Evaluation, Processing and Publication

OPTIMIZATION OF REAL-TIME HOURLY OPERATIONS OF A COMPLEX, MULTIPLE PURPOSE RESERVOIR SYSTEM,
California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 6A.
W79-00501

STATISTICAL AND STOCHASTIC ANALYSES OF SYNTHETICALLY GENERATED URBAN STORM DRAINAGE QUANTITY AND QUALITY DATA,
Purdue Univ., Lafayette, IN. Water Resources Research Center.
For primary bibliographic entry see Field 6A.
W79-00521

DEVELOPMENT OF COMPUTER PROGRAM FOR LINEARIZED SUBHYDROGRAPHS METHOD FOR URBAN RUNOFF DETERMINATION,
Akron Univ., OH. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W79-00526

AN OPEN-COAST MATHEMATICAL STORM SURGE MODEL WITH COASTAL FLOODING FOR LOUISIANA; REPORT 1, THEORY AND APPLICATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W79-00537

AVAILABILITY AND QUALITY OF GROUND WATER IN THE WINSTON AREA, DOUGLAS COUNTY, OREGON,
Geological Survey, Portland, OR. Water Resources Div.
J. H. Robison, and C. A. Collins.
Water-Resources Investigations 77-28 (open-file report), 1978. 2 sheets, 14 ref.

Descriptors: *Groundwater, *Water wells, *Water yield, *Water levels, *Water quality, Maps, Groundwater availability, Hydrogeology, Hydrologic data, Chemical analysis, Oregon, *Douglas County.

A map of the Winston area, Douglas County, Oreg., shows areal geology and locations and chemical diagrams of wells with water analyses. Another map of the area has diagrams showing the depth to water, pumping level, total depth, and yields of selected wells. Reported yields of wells range from less than 1 to as much as 70 gallons per minute; the average is less than 10. A table listing chemical analyses of water shows that, although most ground water is of adequate quality for domestic use, some wells yield water with dissolved constituents in excess of recommended limits. (Woodard-USGS)
W79-00620

THE QUALITY ASSURANCE PROGRAM OF A NATIONAL LABORATORIES SYSTEM,
Geological Survey, Albany, NY. Water Resources Div; and Geological Survey, Reston, VA. Water Resources Div; and Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 5A.
W79-00621

A METHOD FOR ESTIMATING THE REGIONAL EFFECTS OF LAND USE ON RIVER-WATER QUALITY, SUSQUEHANNA RIVER BASIN, PENNSYLVANIA AND NEW YORK,
Geological Survey, Portland, OR. Water Resources Div.
For primary bibliographic entry see Field 5C.
W79-00622

STATISTICAL SUMMARY OF STREAMFLOW DATA FOR KANSAS STREAMS IN THE ARKANSAS RIVER BASIN,
Geological Survey, Lawrence, KS. Water Resources Div.
P. R. Jordan.
Kansas Water Resources Board, Streamflow Characteristics Technical Report No 14A, June 1978. 206 p, 4 fig, 1 tab, 2 ref.

Descriptors: *Streamflow, *Flow duration, *Low flow, *High flow, *Kansas, Streams, Flow rates, Average flow, Gaging stations, Drainage area, Natural flow, Regulated flow, Basic data collections.

Streamflow data for Kansas are summarized from all available daily-flow records through September 30, 1976. These summaries include flow duration by year, low-flow and high-flow sequences, and flow duration by months. Flow-duration summaries serve as a basis for appraising and comparing the hydrologic characteristics of drainage basins and for some classifications of streams for regulatory purposes. Low-flow summaries are useful in appraising the adequacy of streamflow to maintain minimum flows for municipal and industrial water supplies, irrigation, waste dilution, wildlife conservation, and in the design of water-supply reservoirs, and other flood-control works. Data summarized are for unregulated and regulated streamflow, but not for flow in canals such as diversions for irrigation. (Woodard-USGS)
W79-00626

GROUND-WATER DEPLETION, IN FEET, ALLOWED IN A PART OF CURRY COUNTY, NEW MEXICO, BY U.S. INTERNAL REVENUE SERVICE FOR CALENDAR YEAR 1977,
Geological Survey, Albuquerque, NM. Water Resources Div.
J. D. Hudson.
New Mexico State Engineer Map CU-18, 1978. 1 sheet.

Descriptors: *Irrigation wells, *Withdrawal, *Drawdown, *Maps, *Taxes, Water loss, Water levels, Income, New Mexico, *Curry County, *Internal Revenue Service, *Tax deductions.

A map at the scale of 0.5 inch per mile shows areas in Curry County, New Mexico, where values of water level, in feet, have been assigned for the year 1977. This map was prepared cooperatively by the New Mexico State Engineer and the U.S. Geological Survey. It is a guideline map, approved by the U.S. Internal Revenue Service, to be used by landowners in irrigated areas of Curry County to calculate water-depletion losses for income tax purposes. The map is numbered CU-18. Copies may be obtained from the Office of the New Mexico State Engineer. (Woodard-USGS)
W79-00627

GROUND-WATER DEPLETION, IN FEET, ALLOWED IN NORTHERN LEA COUNTY, NEW MEXICO, BY U.S. INTERNAL REVENUE SERVICE FOR CALENDAR YEAR 1977,
Geological Survey, Albuquerque, NM. Water Resources Div.
J. D. Hudson.
New Mexico State Engineer Map LN-20, 1978. 1 sheet.

Descriptors: *Irrigation wells, *Withdrawal, *Drawdown, *Maps, *Taxes, Water loss, Water levels, Income, New Mexico, *Lea County, *Internal Revenue Service, *Tax deductions.

A map at the scale of 0.5 inch per mile shows areas in Lea County, New Mexico, where values of water level, in feet, have been assigned for the year 1977. This map was prepared cooperatively by the New Mexico State Engineer and the U.S. Geological Survey. It is a guideline map, approved by the U.S. Internal Revenue Service, to be used by landowners in irrigated areas of Roosevelt County to calculate water-depletion losses for income tax purposes. The map is numbered LN-20. Copies may be obtained from the Office of the New Mexico State Engineer. (Woodard-USGS)
W79-00628

GROUND-WATER DEPLETION, IN FEET, ALLOWED IN CENTRAL LEA COUNTY, NEW MEXICO, BY U.S. INTERNAL REVENUE SERVICE FOR CALENDAR YEAR 1977,
Geological Survey, Albuquerque, NM. Water Resources Div.
J. D. Hudson.
New Mexico State Engineer Map LC-20, 1978. 1 sheet.

Descriptors: *Irrigation wells, *Withdrawal, *Drawdown, *Maps, *Taxes, Water loss, Water levels, Income, New Mexico, *Lea County, *Internal Revenue Service, *Tax deductions.

A map of the scale of 0.5 inch per mile shows areas in Lea County, New Mexico, where values of water level, in feet, have been assigned for the year 1977. This map was prepared cooperatively by th New Mexico State Engineer and the U.S. Geological Survey. It is a guideline map, approved

by the U.S. Internal Revenue Service, to be used by landowners in irrigated areas to calculate water-depletion losses for income tax purposes. The map is numbered LC-20. Copies may be obtained from the Office of the New Mexico State Engineer. (Woodard-USGS)
W79-00629

GROUND-WATER DEPLETION, IN FEET, ALLOWED IN PORTALES VALLEY, ROOSEVELT COUNTY, NEW MEXICO, BY U.S. INTERNAL REVENUE SERVICE FOR CALENDAR YEAR 1977,
Geological Survey, Albuquerque, NM. Water Resources Div.
J. D. Hudson.
New Mexico State Engineer Map RO-21, 1978. 1 sheet.

Descriptors: *Irrigation wells, *Withdrawal, *Drawdown, *Maps, *Taxes, Water loss, Water levels, Income, New Mexico, *Roosevelt County, *Internal Revenue Service, *Tax deductions.

Map at the scale of 0.5 inch per mile shows areas in Roosevelt County, New Mexico, where values of water level, in feet, have been assigned for the year 1977. This map was prepared cooperatively by the New Mexico State Engineer and the U.S. Geological Survey. It is a guideline map, approved by the U.S. Internal Revenue Service, to be used by landowners in irrigated areas of Roosevelt County to calculate water-depletion losses for income tax purposes. The map is numbered RO-21. Copies may be obtained from the Office of the New Mexico State Engineer. (Woodard-USGS)
W79-00630

WATER RESOURCES OF NORTHEAST NORTH CAROLINA,
Geological Survey, Raleigh, NC. Water Resources Div.
H. B. Wilder, T. M. Robison, and K. L. Lindskov.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A057 484, Price codes: A06 in paper copy, A01 in microfiche. Water-Resources Investigations 77-81, May 1978. 113 p, 71 fig, 6 tab, 73 ref.

Descriptors: *Water resources, Hydrology, *North Carolina, *Coastal Plains, Groundwater resources, Aquifer characteristics, Saline water-freshwater interfaces, Surface waters, Saline water intrusion, Atlantic Ocean, Topography, Northeast North Carolina, Lake Phelps, Lake Mattamuskeet, Albemarle Sound, Pamlico Sound, Castle Hayne limestone, Corporate farms.

Several water-related problems are associated with economic development of northeast North Carolina. The solution to these problems depends in part on adequate knowledge of the hydrology of this 8,930 square mile coastal area. Average annual precipitation on the area is about 50 inches. Of this amount, about 34 inches returns to the atmosphere by evapotranspiration, about 15 inches leaves the area as runoff, and about one inch leaves through ground-water outflow. No large stream originates within the area, but major streams entering from the north and west bring in three times as much streamflow as originates within the study area. The flat, low-lying terrane does not offer opportunities for extensive development of surface-water supplies through the use of reservoirs. Much of the surface water is contaminated by saltwater from the ocean. Ground water occurs in three major aquifers, all of which contain both freshwater and saltwater. (Woodard-USGS)
W79-00631

ON THE DESIGN OF HYDROLOGIC DATA NETWORKS,
Geological Survey, Reston, VA. Water Resources Div.; and Washington, Univ., Seattle; and Princeton Univ., NJ.
For primary bibliographic entry see Field 7A.
W79-00636

GLOBAL DISTRIBUTION OF CARBON DIOXIDE DISCHARGERS, AND MAJOR ZONES OF SEISMICITY,
Geological Survey, Reston, VA. Water Resources Div.; and Geological Survey, Reston, VA. Geologic Div.; and Geological Survey, El Paso, TX. Water Resources Div.
For primary bibliographic entry see Field 2K.
W79-00637

FLOODS IN KANSAS CITY, MISSOURI AND KANSAS, SEPTEMBER 12-13, 1977,
Geological Survey, Rolla, MO. Water Resources Div.; and Geological Survey, Topeka, KS. Water Resources Div.
For primary bibliographic entry see Field 4A.
W79-00638

HYDROLOGIC RECONNAISSANCE OF TSALA APOPKA LAKE, CITRUS COUNTY, FLORIDA,
Geological Survey, Orlando, FL. Water Resources Div.
A. T. Rutledge.
Geological Survey Water-Resources Investigations 77-89 (open-file report), 1977. 1 sheet, 8 fig, 12 ref.

Descriptors: *Lakes, *Surface-groundwater relationshipsm, *Inflow, *Discharge(Water), *Water quality, Maps, Hydrologic data, Groundwater recharge, Groundwater movement, Aquifer characteristics, Ponds, Swamps, Florida, *Tsala Apopka Lake, *Citrus County, *Lake hydrology.

The swamps, marshes, and open waters of Tsala Apopka Lake, Florida, were mapped and the hydrologic connection between the lake and the Floridan limestone aquifer was studied from October 1975 to September 1976. Tsala Apopka Lake is a series of shallow, interconnected lakes, ponds, and marshes whose water surface slopes northward at 0.5 foot per mile. According to aerial photographs of December 1972, only 6 percent of the 103 square miles of study area is covered by open water. Open water is abundant along the western side of the lake, dense and sparse marshes occupy most of the lake area, and swamps occupy a thick zone around the Withlacoochee River which borders the lake to the east. Only a small fraction of the total surface flow occurs through the lake. The average lake outflow through S-351 canal is 23.6 cfs; while the average river flow at Holder is 714 cfs. Tsala Apopka Lake is hydraulically connected to the Floridan aquifer. At low flow, the major source of water in the river is ground water from the Floridan aquifer. The specific conductance of water in the Floridan aquifer averages 250-350 umho/cm (micromhos per centimeter) at 25C in this area. The specific conductance of water in the Withlacoochee River near Holder averages 268 umho/cm at 25C, while water in Tsala Apopka Lake at Hernando averages 139 umho/cm at 25C. (Woodard-USGS)
W79-00639

WATER RESOURCES DATA FOR HAWAII AND OTHER PACIFIC AREAS, WATER YEAR 1977--VOLUME 2. TRUST TERRITORY OF THE PACIFIC ISLANDS, GUAM, AMERICAN SAMOSA, AND NORTHERN MARIANA ISLANDS.
Geological Survey, Honolulu, HI. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-286 978, Price codes: A05 in paper copy, A01 in microfiche. Water-Data Report HI-77-2, May 1978. 90 p, 15 fig.

Descriptors: *Streamflow, *Hydrologic data, *Surface waters, *Groundwater, Gaging stations, Water analysis, Water temperature, Reservoirs, Water wells, Water levels, Data collections, Sites, *Trust Territory of the Pacific Islands, *Guam, *American Samoa, *Northern Mariana Islands.

Volume 2 of water resources data for the 1977 water year for other Pacific areas consists of records of stage, discharge, and water temperature; stage of a reservoir; and water levels in wells and springs. This report contains discharge records for 42 gaging stations, stage only record for 1 gaging station, water temperature for 26 gaging stations, and water levels for 13 observation wells. Also included are 56 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating Governments and Federal agencies in other Pacific areas. (Woodard-USGS)
W79-00640

WATER RESOURCES DATA FOR HAWAII AND OTHER PACIFIC AREAS, WATER YEAR 1977--VOLUME 1. HAWAII.
Geological Survey, Honolulu, HI. Water Resources Div.
Water-Data Report HI-77-1, May 1978. 348 p, 14 fig.

Descriptors: *Hawaii, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Volume 1 of water resources data for the 1977 water year for Hawaii consists of records of stage, discharge, and water quality of streams; and water levels and water quality in wells and springs. This report contains discharge records for 114 gaging stations; water quality for 10 gaging stations, 102 partial-record flow stations and 155 wells; and water levels for 25 observation wells. Also included are 108 crest-stage partial-record stations and 20 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State, Federal, and other agencies in Hawaii. (Woodard-USGS)
W79-00641

WATER RESOURCES DATA FOR MICHIGAN, WATER YEAR 1977.
Geological Survey, Lansing, MI. Water Resources Div.
Water-Data Report MI-77-1, June 1978. 548 p, 9 fig.

Descriptors: *Michigan, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1977 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground water. This report contains discharge records for 195 gaging stations; stage only records for 1 gaging station; stage and contents for 5 lakes and reservoirs; water quality for 77 continuous-record stations, 21 partial-record stations and 7 lakes; and water levels for 45 observations wells. Also included are 88 crest-stage partial-record stations and 31 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are

published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Michigan. (Woodard-USGS)
W79-00642

WATER RESOURCES DATA FOR NORTH DAKOTA, WATER YEAR 1977.
Geological Survey, Bismarck, ND. Water Resources Div.
Water-Data Report ND-77-1, June 1978. 512 p, 6 fig.

Descriptors: *North Dakota, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1977 water year for North Dakota consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality in wells. This report contains discharge records for 131 gaging stations; stage and contents for 13 lakes and reservoirs; water quality for 49 gaging stations, 13 partial-record stations, 12 lakes, and 27 wells; and water levels for 33 observation wells. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in North Dakota. (Woodard-USGS)
W79-00643

WATER RESOURCES DATA FOR NEBRASKA, WATER YEAR 1977.
Geological Survey, Lincoln, NE. Water Resources Div.
Water-Data Report NE-77-1, June 1978. 459 p, 5 fig, 3 tab.

Descriptors: *Nebraska, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1977 water year for Nebraska consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality in wells and springs. This report contains discharge records for 143 gaging stations; stage and contents for 10 lakes and reservoirs; water quality for 37 gaging stations, 19 ungaged stations, 30 partial-record flow stations, and 113 wells; and water levels for 68 observation wells. Also included are 115 crest-stage partial-record stations and 10 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Nebraska. (Woodard-USGS)
W79-00644

FLOOD PLAIN INFORMATION: OGDEN RIVER, OGDEN, UTAH.
Army Engineer District, Sacramento, CA.
For primary bibliographic entry see Field 4A.
W79-00669

FLOOD PLAIN INFORMATION: BOX ELDER CREEK, BRIGHAM CITY, UTAH.
Army Engineer District, Sacramento, CA.
For primary bibliographic entry see Field 4A.
W79-00670

FLOOD PLAIN INFORMATION: WOLF CREEK, LAWTON, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00671

FLOOD PLAIN INFORMATION: CHIKASKIA RIVER, BLACKWELL, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00672

FLOOD PLAIN INFORMATION: PROVO RIVER AND ROCK CANYON CREEK, PROVO-OREM, UTAH.
Army Engineer District, Sacramento, CA.
For primary bibliographic entry see Field 4A.
W79-00673

FLOOD PLAIN INFORMATION: COODY CREEK, MUSKOGEE, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00674

FLOOD PLAIN INFORMATION: HAIKEY CREEK, TULSA COUNTY, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00675

FLOOD PLAIN INFORMATION: PRYOR CREEK AND SALT BRANCH, PRYOR CREEK, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00676

FLOOD PLAIN INFORMATION: STILLWATER CREEK AND TRIBUTARIES, STILLWATER, OKLAHOMA.
Army Engineer District, Tulsa, OK.
For primary bibliographic entry see Field 4A.
W79-00677

ACCESS TO SCIENTIFIC INFORMATION THROUGH COMPUTERIZED INFORMATION SYSTEMS,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 10A.
W79-00684

GREAT LAKES WATER LEVELS 1974. DAILY AND MONTHLY AVERAGE WATER SURFACE ELEVATIONS.
National Ocean Survey, Detroit, MI. Lake Survey Center.
May 1975. 106 p.

Descriptors: *Water levels, *Great Lakes, *Lakes, *Data collections, *Lake Superior, *Lake Ontario, *Lake Huron, *Lake Michigan, *Lake Erie, Daly hydrographs, Surface waters, Monthly, Surfaces, Frequency, Gages, Networks, Distribution, Distribution patterns, Stations, *Water surface elevations.

This publication contained Lake Survey Center Great Lake water-level gage records and showed in tabular form daily and monthly average levels for each gage in the network for the calendar year. It also contained in a separate table, the highest and lowest daily average for the month. In addition, a frequency distribution table of daily average levels showed the number of times each month the recorded levels were above a specified elevation. The gages record water levels in either analog or a digital form on strip charts that are retained for a period of 10 years. Recorded hourly values were used to compute the daily averages, and the monthly values were compiled from the daily averages. The location of the recording water-level gages was shown on preceding page. An index on the following pages listed the gage location, indentification number, and geographic coordinates. The stations are arranged by location and are in numerical order. All tabulated elevations are referred to International Great Lakes Datum (1955) and are expressed in feet. An explanation of the datum (IGLD) can be obtained by writing the Lake Survey Center. (See also W75-00509) (Froehlich-ISWS)
W79-00706

CORPS-WIDE CONFERENCE ON COMPUTER-AIDED DESIGN IN STRUCTURAL ENGINEERING. VOLUME V. GRAVITY MONOLITHS AND U-FRAME LOCKS AND CHANNELS,
Army Engineer District, Walla Walla, WA. North Pacific Div.
For primary bibliographic entry see Field 8B.
W79-00708

OCCURRENCE, QUALITY, AND AVAILABILITY OF GROUND WATER IN JONES COUNTY, TEXAS,
Texas Dept. of Water Resources, Austin.
For primary bibliographic entry see Field 2F.
W79-00709

CALCULATION OF DAILY GROUNDWATER LEVELS IN SWAMPS USING METEOROLOGICAL DATA,
For primary bibliographic entry see Field 4B.
W79-00715

U.S. ARMY CORPS OF ENGINEERS FIFTH HYDROGRAPHIC SURVEY CONFERENCE.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 7B.
W79-00766

WILDERNESS WATER QUALITY: BISHOP CREEK BASELINE STUDY, 1974,
California Univ., Los Angeles. Environmental Science and Engineering.
For primary bibliographic entry see Field 5G.
W79-00859

ENVIRONMENTAL DATA MANAGEMENT: THE IDENTIFICATION OF OUTLIERS,
Kentucky Univ., Lexington. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W79-00863

GALERKIN METHOD FOR A NON-LINEAR PARABOLIC EQUATION WITH MIXED NON-LINEAR BOUNDARY CONDITIONS,
California Univ., Santa Barbara. Coll. of Engineering.
For primary bibliographic entry see Field 2G.
W79-00900

COMPUTER ANALYSIS OF THE WATER BUDGET OF THE PROPOSED OAK OPENINGS NEW TOWN, LUCAS COUNTY, OHIO,
Toledo Univ., OH.
For primary bibliographic entry see Field 4C.
W79-00902

EMERGENCY WATER ALLOCATION LITERATURE: SOURCES AND RETRIEVAL,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00924

EWAP DATA ACCESS SYSTEM - A MANUAL FOR THE USE OF THE EDGE PUNCH CARD FILE,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00925

8. ENGINEERING WORKS

8A. Structures

CONDITION SURVEY OF LOCK AND DAM 52, OHIO RIVER,
Army Engineers Waterways Experiment Station, Vicksburg, MS. Concrete Lab.
B. J. Houston.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 804, Price codes: A06 in paper copy, A01 in microfiche. Miscellaneous Paper C-74-5, April 1974. 106 p, 44 fig, 2 tab, 6 append.

Descriptors: *Locks, *Dams, *Piers, *Ohio River, *Surveys, Concrete, Structures, Concrete structures, Hydraulic structures, Dam failure, On-site investigations, Photography, Boreholes, Inspection, Structural analysis, Damages, Civil engineering.

A program to conduct a condition survey of Lock and Dam 52, which is located on the Ohio River near Paducah, Kentucky, was authorized and funded by the Army Engineer District, Louisville, in June 1972. Lock and Dam 52 was constructed approximately 45 years ago. The purpose of this investigation was to determine the general condition of the structure so that effective plans could be made to accomodate present and future river traffic. The Army Engineer Waterways Experiment Station was contracted to conduct a part of the investigation, including a crack survey, borehole camera studies in drilled holes, underwater television camera crack studies, and sonic studies of the stucture. The Ohio River Division Laboratory (ORDL) conducted physical tests and a petrographic examination of drilled concrete cores. Results of ORDL's tests also were included in this report. The results of the investigations indicated that the concrete in the underwater sills, the piers, and the fixed weir is free from any deleterious chemical reactions. No silica-gel deposits, reaction rims, fractures, or other signs of distress due to alkali-aggregate reaction were found. Cracking of the concrete was extensive, but not excessive, and apparently can be attributed to such physical causes as freeze-thaw cycles of the exposed concrete, normal shrinkage, and foundation problems. (Sims-ISWS)
W79-00710

ENGINEERING CONDITION SURVEY AND STRUCTURAL INVESTIGATION OF LOCKS AND DAM 3, MONONGAHELA RIVER,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Concrete Lab.
C. E. Pace, R. L. Stowe, and A. D. Buck.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 904, Price codes: A16 in paper copy, A01 in microfiche. Miscellaneous Paper C-76-9, August 1976. 371 p, 98 fig, 8 tab, 7 ref, 7 append.

Descriptors: *Locks, *Dams, *Surveys, Inspection, Structural analysis, Structures, Concrete structures, Concrete, Hydraulic structures, Dam failure, Damages, On-site investigations, Photography, Boreholes, Civil engineering, *Monongehela River.

The results of an engineering condition survey and a structural analysis of Locks and Dam 3, Monongahela River, were given. External cracking of the concrete in the lock walls is extensive. Many horizontal and vertical cracks, although isolated and not fitting into a total failure picture, can result in localized failures, especially in critically stressed regions. The outer 2 to 6 ft of concrete as described in the core and photo logs are highly deteriorated. The same condition probably exists in the outer surface of the walls to lower pool. The internal concrete is generally of adequate strength for current design criteria. One exception is a small zone in the downstream gate monolith of the middle wall; a compressive strength of 1150 psi was obtained on the concrete from this zone. The concrete is in a critically stressed area; immediate remedial action was recommended. Pressure grouting as an interim measure was suggested. There is one possible continuous crack in gate monolith R-23; it runs for a depth of 35 ft and possibly extends for two-thirds of the monolith to the riverside. It was recommended that a study be initiated immediately to evaluate rehabilitation or replacement of Locks and Dam 3 on the Monongahela River. (Sims-ISWS)
W79-00712

CAPACITY STUDIES OF GALLIPOLIS LOCKS, OHIO RIVER, WEST VIRGINIA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
L. L. Daggett, and R. W. McCarley.
Technical Report H-78-6, May 1978. 166 p, 4 append, 45 tab, 29 fig, 5 ref.

Descriptors: *Ohio River, *Locks, *Inland waterways, Model studies, *Gallipolis Locks and Dam(WV), West Virginia.

Includes the results of an investigation to determine the physical capacity of the existing Gallipolis Locks, considering both operational and minor structural changes that could improve the locking efficiency. Several alternative operating policies, some requiring structural improvements, were analyzed and compared by employing the computerized TOWGEN/WATSIM (tow generator/waterway simulator) model package. Some proposed improvements were analyzed through the use of hand-computational and/or graphical techniques. The prototype data used in the investigation were collected and summarized through the Performance Monitoring System (PMS) of the Corps of Engineers Inland Navigation Systems Analysis (INSA program. The report includes discussions of the data formats required by the model, calibration of the model, and analysis of model output. A number of capacity curves are presented to show the relation between increasing commodity tonnage, two delays, and lock utilization. Lock capacity levels, interms of tonnage per month and tonnage per year, are tabulated for convenient comparison of all potential operational and structural improvements. Appendix A presents file identification codes for use wth WATSIM, and Appendix B contains a comparison of October and December 1975 PMS data taken at Gallipolis Locks and Dam. (WES)
W79-00762

8B. Hydraulics

AN OPEN-COAST MATHEMATICAL STORM SURGE MODEL WITH COASTAL FLOODING FOR LOUISIANA; REPORT 1, THEORY AND APPLICATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
J. J. Wanstrath.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A053 365, Price codes: A06 in paper copy, A01 in microfiche. Miscellaneous Paper H-78-5, February 1978 (Report 1 of a series). 102 p, 13 tab, 39 pl, 22 ref, append.

Descriptors: *Storm surge, *Mathematical models, *Waves(Water), *Louisiana, Hydrodynamics, Computer programs, Model studies.

A two-dimensional time-dependent, open-coast, long-wave, shallow-water model is presented. The model employs an orthogonal curvilinear coordinate system with telescoping computing cells. This permits greater resolution of the wave in the nearshore coastal region where principal interest is focused rather than at the continental shelf break or at far lateral distances from the region. The model treats the coastline as a finite height barrier which is broken with bay entrances. Coastal overtopping and bay communication with the open sea provide the means for the transport of water across the nominal coastline. Mass is conserved with all water lost from the ocean during the flood stage being stored in discrete bay ponding areas. Each ponding area is described by its particular storage area curve and its particular series of coastline computing grid segments. A prediction/correction method is employed for the computation of the coastal water level. The model has been employed in various tide and storm surge studies. In particular, surge results are presented from four historical hurricanes that affected the Louisiana coast. (WES)
W79-00537

GEORGETOWN HARBOR, SOUTH CAROLINA; REPORT 1, HYDRAULIC SALINITY, AND SHOALING VERIFICATION; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
M. J. Trawle.
Available from National Technical Information Service, Springfield, VA 22161 as AD-A052 340, Price codes: A09 in paper copy, A01 in microfiche. Miscellaneous Paper H-78-6, (Rept. 1 of a series), February 1978. 173 p, 46 tab, 98 pl.

Descriptors: *Salinity, *Tides, *Hydraulic models, Model studies, *Current velocity, *Shoaling, *Georgetown Harbor(SC), Navigation channels.

The Georgetown Harbor model, a fixed-bed model constructed to linear scale ratios of 1:800 horizontally and 1:80 vertically, reproduced a portion of the Atlantic Ocean, Winyah Bay including Mud Bay, North Inlet and marshes between Winyah Bay and North Inlet, the Sampit River including Georgetown Harbor, and the lower portions of the Pee Dee, Black, and Waccamaw Rivers and adjacent marshes. The model was equipped with necessary appurtenances for the accurate reproduction and measurement of tides, tidal currents, salinity instrusion, freshwater inflow, and shoaling distribution. Model verificantion tests, presented in this report, were conducted to ensure that the model hydraulic, salinity and shoaling characteristics were in satisfactory agreement with those of the prototype. The agreements attained between model and prototype were considered satisfactory for the types of tests conducted in the model. The purposes of the model study were (1) to determine the effects on the hydraulic, salinity, and shoaling characteristics of a deepening from 27 to 35 ft of the main navigation channel to Georgetown Harbor and (2) to determine if present maintenance dredging can be reduced by proposed plans involving channel revisions, sediment traps, and freshwater flow diversion. These studies will be reported in later reports.
W79-00540

NAVIGATION CONDITIONS AT ALICEVILLE LOCK AND DAM, MISSISSIPPI AND ALABAMA, TOMBIGBEE RIVER; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
L. J. Shows, and J. J. Franco.
Available from National Technical Information Service, Springfield, VA 22161 as AD-A054 414, Price codes: A05 in paper copy, A01 in microfiche. Technical Report H-78-2, April 1978. 84 p, 7 tab, 5 photos, 31 pl.

Descriptors: *Hydraulic models, *Navigation, Model studies, Mississippi, Alabama, *Tombigbee River(Miss), *Tennessee-Tombigbee Waterway, *Aliceville Lock and Dam(Ala), *Navigation conditions, *Fixed-bed models.

A Fixed-bed model reproducing about 2.8 miles of the Tombigbee River channel and Adjacent overbank was used to determine navigation conditions with the proposed design for the Alicevill Lock and Dam ad to develop any modifications required to eliminate conditions that would adversely affect navigation using the lock. The model was also used to determine conditions that might be expected during construction of the lock and dam with the proposed construction plan. Results revealed the following: (a) satisfactory navigation conditions in the upper lock approach could be developed with modification of the excavation along the left bank of the approach channel and excavation of the right bank in the bend near the upper end of the approach channel; (b) navigation conditions in the lower lock approach could be improved considerably with a dike angled riverward along the right side of the approach channel; (c) two-way traffic in the second bend uspstream of the upper lock approach would be difficult and hazardous during the higher flow; (d) recommended changes to the original plan would have little effect on water-surface elevations in the reach or on conditions that could be expected during construction of the lock and dam.
W79-00541

IMPROVEMENTS FOR MURRELLS INLET SOUTH CAROLINA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
F. C. Perry, Jr., W. C. Seabergh, and E. F. Lane.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A054 242, Price codes: A15 in paper copy, A01 in microfiche. Technical Report H-78-4, April 1978. 339 p, 55 tab, 73 photos, 143 pl, 7 ref.

Descriptors: *Bypasses, *Jetties, South Carolina, *Tidal inlets, *Murrells Inlet(SC), *Channel stabilization.

Murrells Inlet is a natural channel through a sandy beachline that conducts tidal flows between the Atlantic Ocean and a well-mixed lagoon of ocean salinity which has no source of freshwater inflow other than local surface runoff. The inlet provides passage from the ocean to docking facilities for boats. However, due to the influx of sand into the inlet, shallow shifting-sand shoals and breaking waves produce difficult and dangerous navigation conditions. A project for the improvement and stabilization of the inlet was authorized in 1971. A model study was performed to aid in the design of structural solutions to the problem of providing a stabilized channel of sufficient depth and width with provisions for sand bypassing. The model study examined a variety of plans in order to optimize the alignment and spacing of jetties and the proper alignment of interior channels with respect to current patterns. Also, the effects of the plans on bay tidal elevations and tidal currents were determined as were the effects on wave heights. Model testing concluded that plan 1H was the optimal plan for providing a stable entrance channel while providing for sand bypassing. (WES)
W79-00546

MODELING OF HYDRAULIC SYSTEMS BY FINITE-ELEMENT METHODS,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 2A.
W79-00634

CHANNEL ROUTING BY FINITE DIFFERENCE METHOD,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
Y. H. Huang.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 104, No. HY10, Proceedings Paper 14088. p 1379-1393, October 1978. 9 fig. 8 ref.

Descriptors: *Channel flow, *Model studies, *Channels, Flood routing, Finite element analysis, Hydrographs, Kinetics, Routing, Watersheds(Basins), Streams, Computer models, Channeling, *Finite difference models, Kentucky watershed model.

A finite difference model that can be incorporated easily into a watershed model was presented for flood routing through natural stream channels. The advantages of the method lie not only in its simplicity, but also in the ease with which channel data can be determined from topographic maps. The required input on discharge-flow area relationship can be computed by Manning's formula or obtained directly from the water surface profile computer programs. Both the linear and nonlinear methods of channel routing were described. It was found that linear routing is unconditionally stable and yields good results if the time increment is kept sufficiently small. The use of smaller time increments not only reduces the discrepancy between linear and nonlinear routings, but also gives more consistent results when different input data are used to characterize the discharge-flow area relationship. The method was incorporated into MOPSET, a self-calibrating Kentucky Watershed Model, and found to be satisfactory. (Lee-ISWS)
W79-00704

CORPS-WIDE CONFERENCE ON COMPUTER-AIDED DESIGN IN STRUCTURAL ENGINEERING. VOLUME V. GRAVITY MONOLITHS AND U-FRAME LOCKS AND CHANNELS,
Army Engineer District, Walla Walla, WA. North Pacific Div.
N. W. Wilke, C. M. Hargett, and J. W. Simmons.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A031 247, Price codes: A06 in paper copy, A01 in microfiche. Volume 5 of the Proceedings of a Conference held Sept 22-26, 1975, New Orleans, LA., Army Engineer Waterways Experiment Station, Vicksburg, Miss., Aug 1976. 98 p, 15 fig, 19 ref, 3 append. N. Radhakrishnan, editor.

Descriptors: *Computer programs, *Dams, *Locks, *Channels, Conferences, Model studies, Mathematical models, Design, Structural design, Structural models, Computer models, Construction, Hydraulic structures, Engineering, Civil engineering, *Computer-aided design, U-frame channels, U-frame locks, Monoliths.

G M: Gravity monoliths are used for dams, navigation locks, and retaining walls. The structural design of gravity monoliths includes evaluation of foundation conditions and spillway and freeboard requirements and the application of loadings to determine stability against sliding, overturning, and internal stress conditions. Loads are determined as directed by EM's 1110-2-2200, -2400, -2502, and -2602. Loadings include weight of the structure, water, uplift, silt and fill, wind, wave, ice, and seismic and construction loads. U-F L: Navigation locks improve river navigation by decreasing river gradients and increasing water depths. Although U-frames allow greater diversity in design and placement, gravity monoliths, because of their simplicity in design and construction, have been used in the United States almost to the exclusion of the U-frame monolith. U-frames have, however, been used successfully by the Corps. U-F C: At least nine different computer programs were used by the Corps of Engineers in the analysis and design of U-frame channels. This report gave program abstracts and evaluations of five of them. The report also offered a few comments on the present state of Corps use of computer programs for design of U-frame channels. (Sims-ISWS)
W79-00708

BICYCLE-SAFE GRATE INLETS STUDY. VOLUME I - HYDRAULIC AND SAFETY CHARACTERISTICS OF SELECTED GRATE INLETS ON CONTINUOUS GRADES,
Bureau of Reclamation, Denver, CO. Engineering and Research Center.
P. H. Burgi, and D. E. Gober.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 510, Price codes: A13 in paper copy, A01 in microfiche. Report FHWA-RD-77-24, June 1977. 285 p, 170 fig, 34 tab, 14 ref, 2 append. DOT PO-5-3-0166.

Descriptors: *Drains, *Storm drains, *Urban runoff, *Hydraulics, Laboratory tests, Runoff, Storm runoff, Surface runoff, Inlets(Waterways), Drainage, Efficiencies, Safety, Design, Equipment, *Bicycle safety, *Grate inlets, Drainage design, Debris.

Eleven drain inlet grates were tested to evaluate their safety characteistics for bicycle as well as pedestrian traffic. Four of the grates that rated highest in the safety tests were selected for hydraulic testing. Three other grates with designs and bar spacings similar to grates proven safe also were selected for hydraulic testing. A parallel bar grate was included in the hydraulic test program as a standard with which to compare the performance of the other tests grates. Hydraulic and debris tests were performed on full-size grates in sizes of 2 ft by 4 ft (0.61 m by 1.22 m) and 2 ft by 2 ft (0.61 m by 0.61 m). The grates were tested at cross slopes of 1:48, 1:24, 1:16 and longitudinal slopes of 0.5, 1, 2, 4, 6, 9, and 13%, with gutter flows up to 5.6 cu ft/s (0.158 cu m/s). Debris tests were run using 150 pieces of 3 inch by 4 inch paper debris. Test results showed that two of the grate designs (a cast and a steel fabricated grate) are nearly as hydraulically efficient as the parallel bar grate and considerably more efficient than the other grate designs tested. One other design (a steel fabricated grate) showed high hydraulic efficiencies at longitudinal slopes up to 6%. These three grate designs were recommended for additional testing. A grate's ability to handle debris without clogging was shown to be most dependent on the spacing of its longitudinal bars. Grates with the widest longitudinal bar spacings tested consistently outperformed grates with narrower longitudinal bar spacings. (Sims-ISWS)
W79-00714

PRELIMINARY EVALUATION OF WIND AND WAVE EFFECTS AT POTENTIAL LNG TERMINAL SITES, STATE OF CALIFORNIA: APPENDIX A: AN EVALUATION OF THE RELATIVE WAVE CLIMATE AT FIVE ONSHORE LNG SITES CONSIDERING ISLAND INFLUENCES AND TOPOGRAPHIC EFFECTS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
L. Z. Hales.
Miscellaneous Paper H-78-2, April 1978. 553 p, 21 tab, 8 ref, 2 addendum.

Descriptors: *Waves(Water), *Refraction(Water waves), *California, *Winds, Topography, *Wave heights, *Liquefied Natural Gas terminal sites, Wind waves.

Evaluates the wave climate at alternate potential Liquefied Natural Gas (LNG) terminal sites by applying existing hindcast wave data of a general nature to obtain estimates of the times of excessive wave conditions at various sites. Also, analyzes the effects of island sheltering and topographic influences on the wave climate at five onshore shites for a more refined estimate of wave conditions. Because of questions involving the development of the deepwater hindcast wave data used and indications of conflicting evidence, this analysis is only a relative evaluation and should not be interpreted as projections of actual downtime, but

rather as a consistently uniform basis for comparison. It was determined that the wave climate at Rattlesnake Canyon is statistically significantly greater than those sites of Point Conception, and the remaining onshore sites are not statistically significantly different from each other. Because of the sheltering effect of the offshore islands and the physically shielding orientation of the southern California coastline from the severe northwest wave climate, any of the proposed onshore sites south of Point Conception appear to be viable potential LNG terminal sites in the absence of additional protective structures. (WES)
W79-00756

MODEL STUDIES OF THE PORTUGUES AND BUCANA RIVERS CHANNELIZATION, PUERTO RICO; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
N. R. Oswalt.
Technical Report H-78-3, May 1978. 86 p, 23 photo, 44 pl.

Descriptors: *Puerto Rico, *Bucana River, *Channel improvement, *Drops(Structures), *Flood control, *Hydraulic models, *Portugues River, *Bucana River.

Two 1:30-scale physical hydraulic models of the Portugues and Bucana Rivers were used to determine the adequacy of the original designs for the flood control channelization project through the city of Ponce, Puerto Rico. The proposed channelization included trapezoidal to rectangular channel transitions, stilling basins, and drop structures in the high-velocity channels. Test results indicated the original design with certain modifications would effectively transmit all expected flood releases from the proposed Portugues and Cerrillos Dams. Modifications to transitions at entrances to the high-velocity channel reaches were streamlined within the original right-of-way to reduce surface turbulence and standing waves. Geometry of the original stilling basins was atered to prevent the oblique hydraulic jumps and the end-sill heights were lowered to reduce the water-surface drawdown, surface roller waves, and high bottom velocities downsstream of each basin. the original design Bucana Channel drops structures were recommended for the prototype because the preventive measures required to eleiminate the tendency for eddying near design flows created additional problems and cost. Two riprap plans were developed for the four Bucana drop structures. Modification to the Portugues stilling basins were recommended based on the results of the Bucana stilling basin test. (WES)
W79-00761

EFFECT OF DEPTH ON DREDGING FREQUENCY; REPORT 1, SURVEY OF DISTRICT OFFICES,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 4A.
W79-00767

AN EXPERIMENTAL STUDY OF FLOW AND OXYGEN TRANSFER IN CIRCULATION INDUCED BY AIR BUBBLE PLUMES,
New Hampshire Univ., Durham. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 2E.
W79-00856

8D. Soil Mechanics

INVESTIGATION OF THE LIQUEFACTION POTENTIAL AT THE W.G. HUXTABLE PUMPING PLANT SITE,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Soils and Pavements Lab.
W. F. Marcuson, III.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A025 497, Price codes: A05 in paper copy, A01 in microfiche. Misscellaneous Paper S-76-8, April 1976. 87 p, 23 fig, 3 tab, 8 ref, 4 append.

Descriptors: *Sands, *Soils, *Soil stability, *Foundations, Soil physical properties, Soil density, Sampling, Cores, Earthquakes, Loads(Forces), Soil profiles, Laboratory tests, X-ray analysis, Sieve analysis, Stress, Depth, Liquefaction(Soils), Cyclic triaxial loading.

The site of the W.G. Huxtable Pumping Plant, located on the banks of the Mississippi River 60 miles south of Memphis, Tennessee, was investigated with regard to liquefaction potential. Cyclic triaxial compression tests were performed on remolded samples at various densities. An analysis was made using Seed's Simplified Procedure. As a result of this analysis, the structural excavation will be carried to a depth of approximately 47 ft. The exposed foundation is to be treated by compaction and soil stabilization techniques. (Visocky-ISWS)
W79-00713

8F. Concrete

CONDITION SURVEY OF LOCK AND DAM 52, OHIO RIVER,
Army Engineers Waterways Experiment Station, Vicksburg, MS. Concrete Lab.
For primary bibliographic entry see Field 8A.
W79-00710

ENGINEERING CONDITION SURVEY AND STRUCTURAL INVESTIGATION OF LOCKS AND DAM 3, MONONGAHELA RIVER,
Army Engineer Waterways Experiment Station, Vicksburg, MS. Concrete Lab.
For primary bibliographic entry see Field 8A.
W79-00712

8I. Fisheries Engineering

EVALUATION OF RECIRCULATING SYSTEMS FOR THE CULTURE OF CHANNEL CATFISH,
Memphis State Univ., TN. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W79-00682

CULTURE OF CHANNEL CATFISH IN A HIGH FLOW RECIRCULATING SYSTEM,
Memphis State Univ., TN. Dept. of Biology.
For primary bibliographic entry see Field 5G.
W79-00683

ENTRAINMENT AT A ONCE-THROUGH COOLING SYSTEM ON WESTERN LAKE ERIE,
Michigan State Univ., East Lansing. Inst. of Water Research; and Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W79-00878

A VERSATILE PUMP-SAMPLER FOR LIVE ZOOPLANKTON,
Central Electricity Generating Board, Southampton (England). Marine Lab.
For primary bibliographic entry see Field 7B.
W79-00949

EVALUATION OF AN AIR BUBBLER TO MITIGATE FISH IMPINGEMENT AT AN ELECTRIC GENERATING PLANT,
Texas Instruments Inc., Buchanan, NY.
For primary bibliographic entry see Field 5G.
W79-00950

9. MANPOWER, GRANTS AND FACILITIES

9D. Grants, Contracts, and Research Act Allotments

ANNUAL REPORT 1976-1977.
Hawaii Univ., Honolulu. Water Resources Research Center.
(1977). 66 p, 1 tab.

Descriptors: *Water resources, *Water pollution, *Hydrology, *Water management, *Waste disposal, *Hawaii, Ecology, Meteorology, Biological pollution, Groundwater, Irrigation, Eutrophication, Groundwater movement, Recycling, Urbanization, Flooding, Water quality, Water conservation, Waste water treatment, Viruses, Algae, Waste water disposal, Sewage.

Twenty-six research projects dealing with water problems of Hawaii were carried out during the fiscal year 1976-1977. Each of these was summarized and a brief discussion of project objectives, research accomplishments, and applications was included. Meteorological studies focused on analyses of high intensity rainfall data and satellite imagery for investigation of mesoscale rainfall regimes. A variety of projects were carried out in the area of water pollution including studies on pollutants, such as heavy metals, carcinogens, and viruses. Waste disposal problems were addressed in reports on cesspool leachates, land disposal at the Kaneohe Marine Corps Air Station, rotating disc sewage treatment systems for suburban developments, and recycling sewage water by irrigation of sugar cane. The biological aspect of waste disposal was represented by research and algal growth potential of waste effluents, biological monitoring of a sewage outfall, and a survey of pathogenic enteric viruses in Hawaiian ocean environment. Topics related to water conservation and management included watershed monitoring studies, groundwater budget and coastal discharge, infiltration characteristics of selected Hawaiian land types, and urban flood hydrology. Other projects lay in the fields of information transfer, ecological evaluation of a coral reef ecologic system, eutrophication of Lake Wilson, and a hydraulic device for opening sediment plugs in Oahu stream mouths. A list of technical reports and memoranda and contributions of the technical staff to other publications concludes the report. (Majetnyi-IPA)
W79-00883

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

ACCESS TO SCIENTIFIC INFORMATION THROUGH COMPUTERIZED INFORMATION SYSTEMS,
Arizona Univ., Tucson. School of Renewable Natural Resources.
L. M. White.
Progressive Agriculture in Arizona, Vol. 28, No. 3, p 10-12, May-June, 1975. OWRT A-042-ARIZ(7), 14-31-0001-3803.

Descriptors: Computers, *Information retrieval, *Information exchange, Automation, Documentation, Publications, Bibliographies, United States, Southwest U.S., Arizona, Water resources, Natural resources, Agriculture, Bibliographic searches, Information systems, Literature searches.

Literature is proliferating in the fields of science (i.e., each year over 400,000 articles appear in major journals and periodicals). It is increasingly difficult for an individual to delve into the literature and extract information on some topic of interest. Computer based information systems are increasingly being used to help scientists, researchers, laymen, and students to identify appropriate documents. These systems have been developed by governmental agencies and departments, by abstracting and indexing companies, by national or regional libraries, by professional societies, by universities, by public libraries, or by private businesses. If they are bibliographic information systems, they provide for the user either references or references and document copies. Six computer based systems--chosen because of their general usefulness to persons in agriculture and natural resources in Arizona are described. The systems are: the National Agricultural Library's CAIN, the Office of Water Resources Research's WRSIC, the Smithsonian Science Information Exchange, the National Technical Information Service, The Arid Lands Information System, and the Watershed Management Information System. For each, information is given on the developing organization, scope of the system, type of product, and contact source. Hopefully, this information will help direct potential users to an appropriate system.
W79-00684

10C. Secondary Publication And Distribution

THE EXPLOITATION OF EXTRACTIVE RESOURCES: A SURVEY,
For primary bibliographic entry see Field 6B.
W79-00584

A SELECTED ANNOTATED BIBLIOGRAPHY OF ECONOMIC VALUES OF FISH AND WILDLIFE AND THEIR HABITATS,
North Dakota State Univ., Fargo. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 6C.
W79-00912

EMERGENCY WATER ALLOCATION LITERATURE: SOURCES AND RETRIEVAL,
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 4A.
W79-00924

A REVIEW OF THE BIOLOGY OF BRITISH NAIDIDAE (OLIGOCHAETA) WITH EMPHASIS ON THE LOTIC ENVIRONMENT,
University of Wales Inst. of Science and Technology, Cardiff. Dept. of Applied Biology.
For primary bibliographic entry see Field 5C.
W79-00971

WATER CONSERVATION INFORMATION DISSEMINATION DURING 1977 DROUGHT EMERGENCY,
Utah Center for Water Resources Research, Logan.
For primary bibliographic entry see Field 3B.
W79-01000

10D. Specialized Information Center Services

ACCESS TO SCIENTIFIC INFORMATION THROUGH COMPUTERIZED INFORMATION SYSTEMS,
Arizona Univ., Tucson. School of Renewable Natural Resources.
For primary bibliographic entry see Field 10A.
W79-00684

WATER CONSERVATION INFORMATION DISSEMINATION DURING 1977 DROUGHT EMERGENCY,
Utah Center for Water Resources Research, Logan.
For primary bibliographic entry see Field 3B.
W79-01000

10F. Preparation Of Reviews

THE PRODUCTION BIOLOGY OF EURASIAN WATERMILFOIL (MYRIOPHYLLUM SPICATUM L.): A REVIEW,
Michigan State Univ., Hickory Corners. W.K. Kellogg Biological Station.
For primary bibliographic entry see Field 5C.
W79-00768

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SOURCE	ACCESSION NUMBER	TOTAL
A. CENTERS OF COMPETENCE		
Cornell University, Policy Models for Water Resources Systems	W79-00914	1
Franklin Institute (FIRL), Municipal and Industrial Wastewater Treatment Technology	W79-00727--00729 00731	4
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University of North Carolina, Metropolitan Water Resources Planning and Management	W79-00645--00654 00656--00658 00660--00661 00663--00667 00669--00677 00875	30
University of Wisconsin, Eutrophication	W79-00551--00557 00559--00576 00578--00579 00581, 00595 00768--00787	49
University of Wisconsin, Water Resources Economics	W79-00582--00584 00586--00589 00596--00598 00788--00793	16

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SOURCE	ACCESSION NUMBER	TOTAL
B. STATE WATER RESOURCES RESEARCH INSTITUTES	W79-00523--00528 00530--00535 00678--00684 00854--00874 00898--00901 00908--00913 00919--00926	58
C. OTHER		
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Information Planning Associates, Inc.	W79-00501--00514 00876--00883 00902--00907	28
National Oceanic and Atmospheric Administration	W79-00885--00888 00892 00894--00897 00927--00936 00992--00999	27

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SOURCE	ACCESSION NUMBER	TOTAL
C. OTHER (CONTINUED)		
Ocean Engineering Information Service (Patents)	W79-00820--00847 00850--00853	32
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U. S. Geological Survey	W79-00620--00632 00634--00644	24
University of Massachusetts (Wetlands)	W79-00984 00987--00990	5

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SOURCE	ACCESSION NUMBER	TOTAL
B. STATE WATER RESOURCES RESEARCH INSTITUTES	W79-00523--00528 00530--00535 00678--00684 00864--00874	68
C. OTHER (CONTINUED) Ocean Engineering Information Service (Patents)	W79-00820--00847 00850--00853	32
C. OTHER Ocean Engineering Information Service (Outer Continental Shelf)	W79-00719--00725 00730, 00735 00739--00747 00749	33
Army Engineer Waterways Experiment Station	W79-00521--00522 01000	47
U. S. Geological Survey	W79-00820--00832 00834--00844	25
University of Massachusetts (Wetlands)	W79-00898 00897--00900	5
Environmental Information Services, Inc. (Effects of Pollutants on Aquatic Life)	W79-00813--00818 00827--00872 00874--00883	60
Information Planning Associates, Inc.	W79-00501--00518 00876--00878 00902--00907	28
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